

Practical Applications of TIS Series

Use of TIS to Target Needs for Improvement of Training Programs

Technical Research and Analysis Center

U.S. Department Of Energy

Environment, Safety and Health

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Prepared by:

H.K. Nelson, SCIENTECH, Inc.
Dr. R.J. Nertney, SCIENTECH, Inc.

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INTRODUCTION

The purpose of this document is to describe ways in which the Technical Information System (TIS) may be used to support design and evaluation of training programs. While this particular study is primarily related to ES&H considerations, the material is directly applicable to training program design for other operational objectives. Much of the information accessible from TIS is directly relevant to general system operational effectiveness.

This document discusses the sort of information that can be retrieved from TIS and provides examples of the retrieval process. The examples included in this study are not intended to be a situation report but, rather, indicate how information may be assembled for purposes of creating situation reports to aid in training program upgrades.

TYPES OF INFORMATION

As indicated in **Figure 1**, the training program designer/evaluator should make use of four basic types of information in the design or evaluation of training programs:

- A. General reference information and knowledge relating to the effective design of training programs must be utilized. For example, parameters and criteria involved in the evaluation of training programs as identified by Institute for Nuclear Power Operations (INPO), see **Figure 2**. Note that design and evaluation of individual training programs should contribute to, as well as utilize, the global knowledge or information pool.
- B. Generic theory and knowledge must be linked to the particular systems under analysis through system specific analyses. This includes use of such analytical tools as job analysis and (risk based) task analysis.
- C. Information relative to training deficiencies obtained from such oversight activities as Progress Assessments, Baseline Compliance Assessments, and Environmental Audits should be utilized.
- D. Actuarial evidences of training deficiencies indicated by accidents and incidents should be considered.

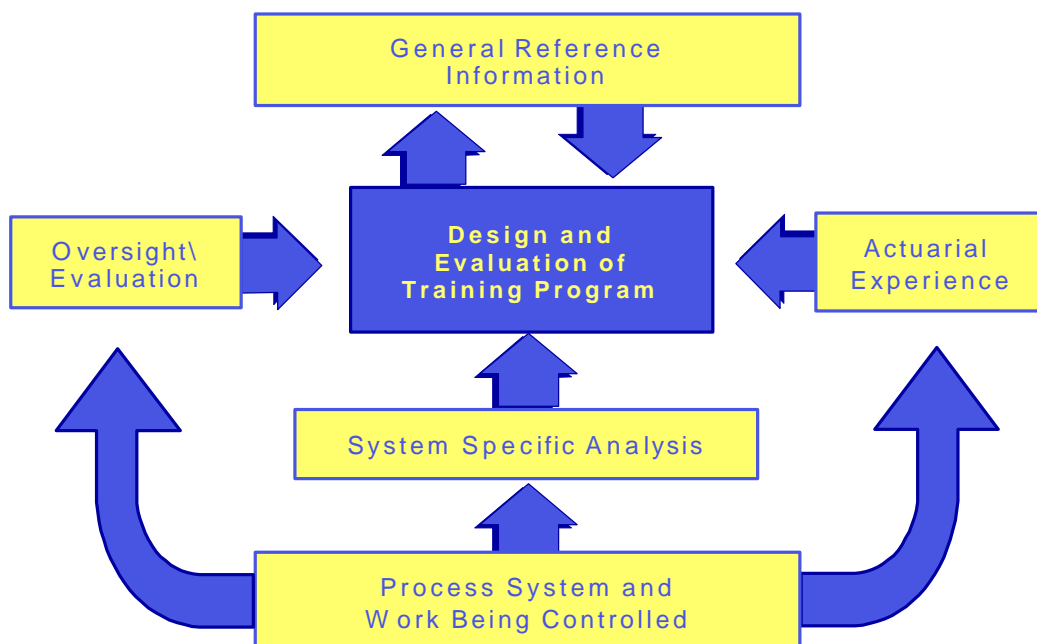


Figure 1. Information and Knowledge Utilized in the Risk Based Design and Evaluation of Training Programs.

CAUSAL FACTOR WORKSHEET					
1. Training/Qualification <input type="checkbox"/> Applicable <input type="checkbox"/> Not Applicable		- How the training program was developed and the process or presenting information on how a task is to be performed prior to accomplishing the task. (Note: Form Previously Called Training/Qualification Method and Content)			
1. Was Training Content Established by Task Analysis?	I	II	III	IV	
a. Yes					
b. No					
2. How Long Since Person Involved Successfully Performed/Showed Competence in Task?	I	II	III	IV	
a. Less than 1 week					
b. 1 week to 1 month					
c. Between 1 and 6 months					
d. Between 6 months and 1 year					
e. More than 1 year					
f. Never performed task					
3. How Was Person Involved Trained for Task?	I	II	III	IV	
a. Classroom lecture					
b. Laboratory training					
c. Guided self-study/computer assisted					
d. Informal on-the-job training					
e. Structured on-the-job training					
f. Part-task simulator					
g. Plant-specific control room simulator					
h. Generic control room simulator					
i. Equipment mock-up					
j. Skill learned on previous job at another facility					
k. No training provided					
l. Other (specify)					
Why were training methods a cause?					
Rate (1, 2, 3) each contributing factor: 1 = Primary 2 = Secondary 3 = Possible	4. Content Did Not Adequately Address	I	II	III	IV
	a. Generic systems/components				
	b. Specific systems/components				
	c. Systems/components being operated or worked on				
	d. Tools or equipment used to perform task				
	e. Procedures/requirements used to perform task				
	f. Relation of task to overall plant operations				
	g. Potential consequences of inappropriate actions				
	h. Verification/self-checking practices				
	i. Importance of quality control function				
	j. Job performance standards				
	k. How to work as a crew/team				
	l. Demonstrating task proficiency				
	m. Other (specify)				
5. Training Method	I	II	III	IV	
a. Inadequate presentation of course materials					
b. Insufficient practice or hands-on experience					
c. Inadequate assessment of task proficiency					
d. Insufficient refresher training					
e. Absence of training objectives					
f. Task performance deficiencies not fed back into development of objectives					
g. No training provided					
h. Not properly coordinated with change implementation					
i. Inadequate simulator fidelity					
j. Other (specify)					

Figure 2. Criteria developed by INPO for the Evaluation of Training Adequacy.

INFORMATION AVAILABLE FROM TIS

QUALITY

The Technical Information Services (TIS) provides access to valuable reference information, oversight data, and actuarial data. A *partial*¹ listing of the information sources is shown on **Table 1**. Many of these resources can be used to determine areas in which training inadequacies have been detected. For example:

- Concerns expressed by oversight audit and appraisal activities may be recovered from the *Facility Profile Information Management System* (e.g., Progress Assessments, Baseline Compliance Assessments, Environmental Audits and Action Plans, Environmental Assessments, and Environmental Impact Statements). These concerns range from rather specific references to particular training problems to broad areas of concern related to general management control.
- Training inadequacies revealed by investigation of field level accidents and incidents may be recovered from the *Computerized Accident/Incident Reporting System* (includes information related to property loss, injury/illness, and vehicle accidents) and the *Occurrence Reporting and Processing System* (includes information related to operational occurrences).
- Complementing the performance data and inadequacy information revealed by the TIS actuarial and oversight resources, TIS contains other general reference material related to training and training requirements.

QUANTITY

In addition, the quantity of data available from TIS is notable. Searching a total of four reference, two oversight, and two actuarial sources yields the results shown in **Figure 3**. These sources were screened for available information related to training by performing a simple word search (“*training*”) on all of the narrative material. DOE Directives (both old and new series), OSHA Regulations, ANSI Standards, Baseline Compliance Assessments, Progress Assessments, Occurrence Reports (ORPS), and Accident Reports (CAIRS) were selected as the resources. Reference sources returned over 400 references, oversight sources returned over 2,000 references, and actuarial sources returned over 10,000 references.

¹ Because TIS connects you to (via the Internet) thousands of worldwide environment, safety, and health resources, a full listing of resources is not contained in this document.

Table 1. Listing (*partial*) of resources, by information type, available from the Technical Information Services.

Information Type	Resource	Type of Access	Address/Contact
Resource Data	Lines of Inquiry - - Assessment, Appraisal, Operational Readiness Review, and Accident Investigation	General Access	http://www.tis.eh.doe.gov:80/systems/trac/trac.html
	Health and Safety Plan Guidelines	General Access	http://www.tis.eh.doe.gov:80/docs/osh.html
	OSH Technical Reference Manual	General Access	http://www.tis.eh.doe.gov:80/docs/osh.html
	Implementation Guidance - Occupational Radiation Protection	General Access	http://www.tis.eh.doe.gov:80/docs/osh.html
	American National Standards Institute	General Access	http://www.tis.eh.doe.gov:80/docs/regs.html
	OSHA Standards and Related Documents	General Access	http://www.tis.eh.doe.gov:80/docs/regs.html
	Code of Federal Regulations from Counterpoint	Subscription (DOE LAN users have a subscription by default)	http://www.tis.eh.doe.gov:80/docs/regs.html
	DOE Technical Standards	General Access	http://www.tis.eh.doe.gov:80/docs/regs.html
Oversight Data	Facility Profile Information Management System (FPIMS)	General Access	http://raleigh.dis.anl.gov:81/
	Risk Information Management System (RIMS)	General Access	http://raleigh.dis.anl.gov:8200/
Actuarial Data	Computerized Accident/Incident Reporting System (CAIRS)	Registered Users	EH-72 (800) 473-4375
	Occurrence Reporting and Processing System (ORPS)	Registered Users	EH-72 (800) 473-4375
	Radiation Exposure Module (REM)	Registered Users	EH-72 (800) 473-4375
	DOE's Web Page for Information on Occupational Radiation Exposure	General Access	http://www.saic.com:80/home/doe_rad/
	Occupational Injury and Property Damage Summary Reports	General Access	http://www.tis.eh.doe.gov:80/docs/osh.html

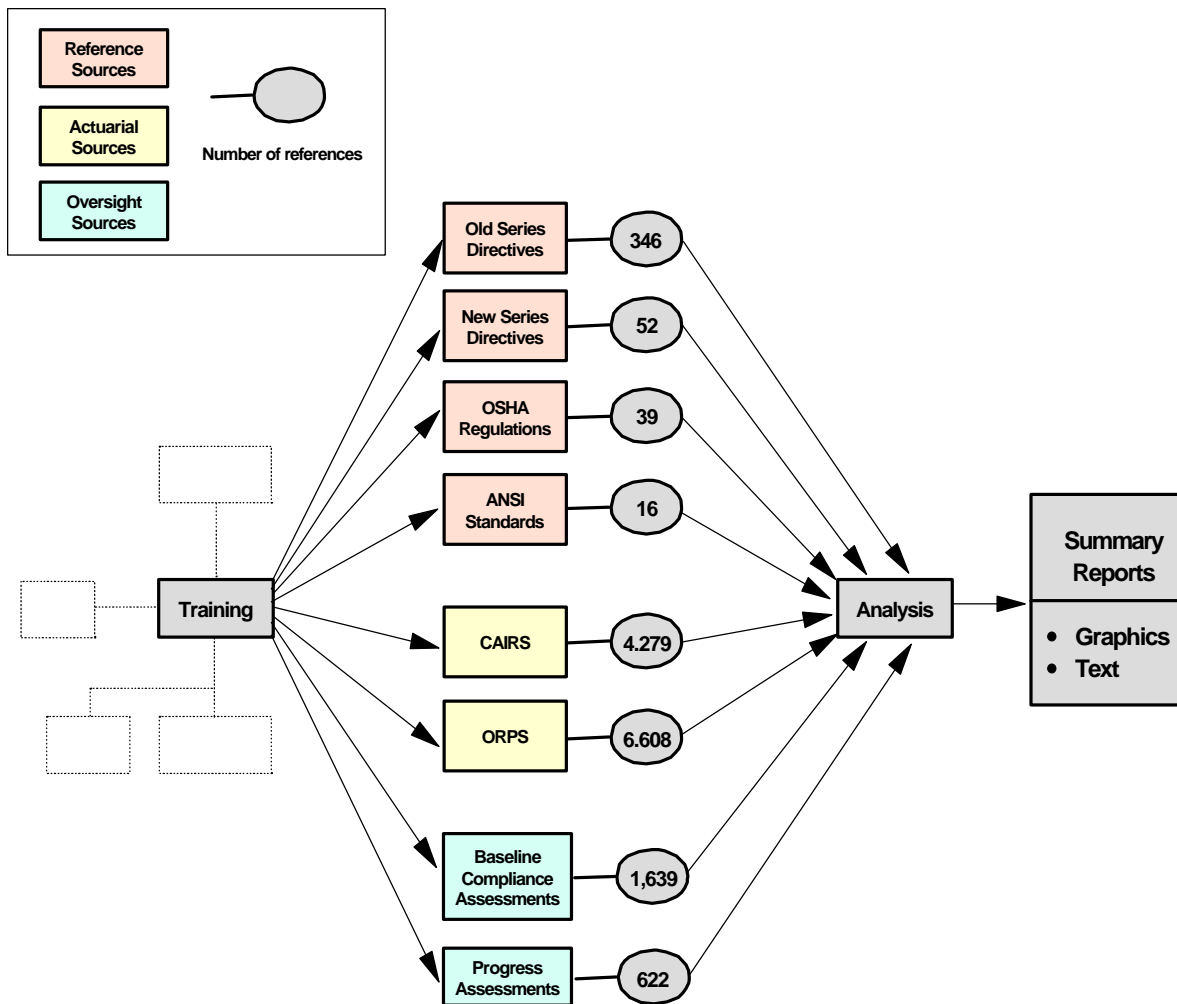


Figure 3. Results of Natural Language Search Based on the Word “Training.”

INFORMATION RETRIEVAL AND THE STUDY AREA

TIS takes full advantage of the graphical power in Windows. Using graphical icons, common operations such as printing and saving information are standardized and simple. The graphical interface also creates a user-friendly environment for searching. A “point and click” environment, consistently used throughout the system, means easy access to all types of information. Reference, oversight, and actuarial information, specific to training, can be extracted through narrative searches. In addition, searches of checklist categories and special report features are provided with actuarial data bases (e.g., ORPS and CAIRS).

To effectively establish a study area, the evaluator should know the structure and nature of the information sources being accessed². For example, oversight information is structured in a hierarchical manner which ranges from detailed findings, through specific conclusions to summary conclusions and development of issues. An understanding of the data will enable the evaluator to specify search criteria using one or more of the standard methods for defining a study area described below.

Standard methods for defining a study area:

- The study area may be defined by performing sequential searches to isolate an area of interest (See **Figure 4**). For example, cases related to leaks, spills, contamination and releases (area #1), having to do with valves (area #2) in which training was identified in a causal role (area #3).
- The study area can be narrowed by considering relatively serious events and conditions or broadened by considering less serious events (See **Figure 5**). Seriousness scales vary between sources. CAIRS accidents, for example, are identified in terms of the required type of investigation (Type A, B, C), while “priorities” are sometimes used to scale appraisal concerns.
- The study area may be narrowed to specific administrative or technical areas of interest such as a field office or a particular type of activity (See **Figure 6**). In this case, one will often wish to use low seriousness level data to “fill out” the data statistically.

² Frequently information related to data structure and fields is available through on-line help files.

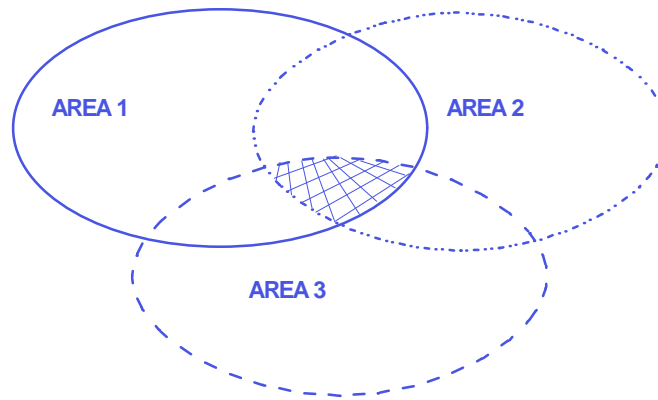


Figure 4. Sequential retrieval.

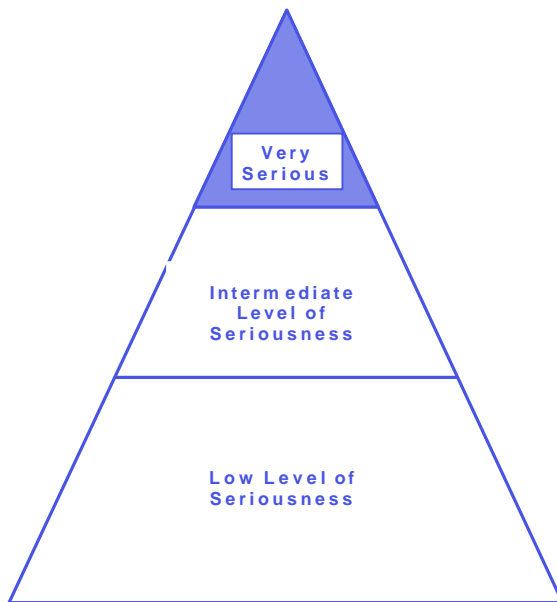


Figure 5. Retrieval based on severity.

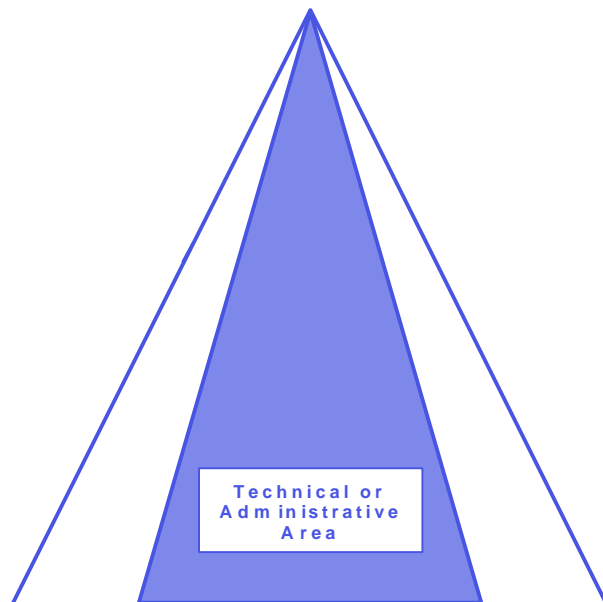


Figure 6. Retrieval in area of interest.

Note that the shading in **Figures 4, 5, and 6** represents information retrieved.

There are ordinarily two basic types of objectives associated with efforts to use TIS to support improvements of training programs:

- To search out weaknesses in the training system which have not been explicitly identified and targeted for improvement.
- To more specifically identify the role of training in an already known problem area. For example, the role of training in valving problems which result in leaks and spills.

The generic processes for these objectives are summarized in **Table 2**. Note that skillful selection of the method(s) used to define the study area will determine the effectiveness of the process.

Table 2. Generic Processes for Using TIS in Support of Training Program Improvement.

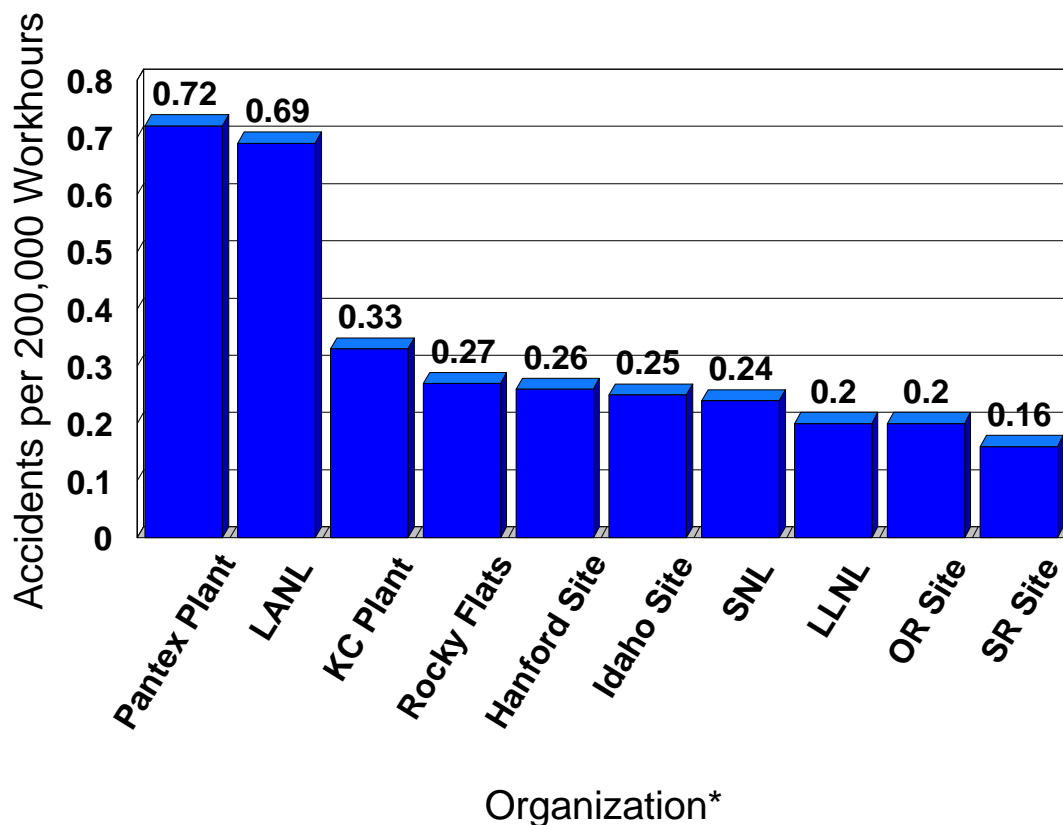
Objective: General search for training inadequacies	Objective: Search for training inadequacies in <i>known</i> problem area
First , scope search to administrative or technical area of interest.	First , scope search to administrative or technical area of interest.
Second , retrieve data based on <i>training</i> references.	Second , retrieve data based on <i>known</i> problem parameters.
Third , relate reported training inadequacies to actual or potential ES&H consequences.	Third , relate <i>known</i> problem to reported training inadequacies.
Fourth , extract additional related summary or detail data.	Fourth , extract additional related summary or detail data.
Fifth , summarize indicated needs for training improvement, including sensitivity and cost effectiveness studies.	Fifth , summarize indicated training improvements to solve or ameliorate <i>known</i> problem including sensitivity and cost effectiveness studies.
Sixth , feed information to training program development or improvement process.	Sixth , feed information to training program development or improvement process.

EXAMPLES

The examples which follow are designed to illustrate the extraction of data from TIS in accordance with the preceding discussion. TIS is extremely flexible in permitting users to tailor both the information search and data retrieval to their particular needs. Once the data are located and extracted, situation reports relevant to the user's particular training design or improvement project may be developed. Use of specific tools for analysis or presentation of data is beyond the scope of this paper. Information related to the application of result and process focus tools can be found in *Practical Application of TIS Series - Tools for the Evaluation of Data in an Integrated Environment*.

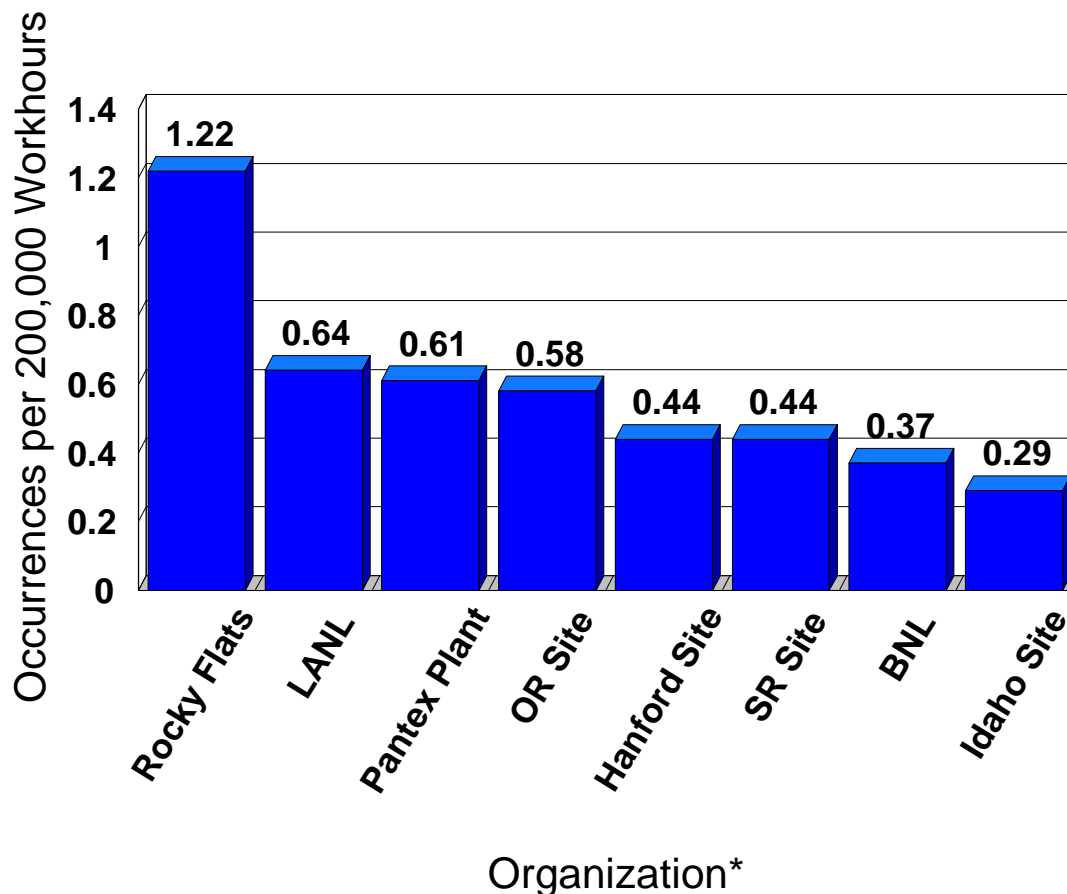
EXAMPLE 1

This example illustrates the process used to discover weaknesses, which have not been explicitly identified, in the training system. The study area was scoped based on the relative frequency of accident cases that reference training in the accident narrative (see **Figure 7**) and of occurrence reports that reference training in the causal factor narrative (see **Figure 8**).



* Only organizations reporting 80 or more accidents referencing training are displayed.

Figure 7. Distribution of DOE Organizations by Accident Reports that Reference Training. (Normalized to number of accidents per 200,000 workhours.)



* Only organizations reporting 80 or more occurrences referencing training are displayed.

Figure 8. Distribution of DOE Organizations by Occurrence Reports that Reference Training. (Normalized to number of occurrences per 200,000 workhours.)

Severity was also considered by extracting Class A Investigations from CAIRS. A total of five Class A Investigations referenced training in the accident narrative. In this way, the study area is narrowed to focus on a “hot-spot” within an administrative area of interest (i.e., organization).

The Los Alamos National Laboratory shows the second highest rate for both accidents and occurrences. In addition, LANL experienced four of the five Class A Investigation. This example continues by showing retrieval of data from the Computerized Accident/Incident Reporting System (CAIRS), and data from the Facility Profile Information Management System (FPIMS) and the Occurrence Reporting and Processing System (ORPS) relevant to training programs at the Los Alamos National Laboratory.³

³ The evaluator should be mindful that reducing the scope of the study area may decrease the statistical density of the data.

FPIMS - Baseline Compliance Assessment

An assessment of the Los Alamos National Laboratory was conducted by DOE in November 1991. The *concerns* cited by this assessment were searched for references to training. The general hierarchical arrangement of findings extracted from the search is shown in **Figure 9**. The hierarchical levels are traceable in the sense that concerns are keyed to the related findings. References to training range in generality from very specific criticism of a particular training element to very broad conclusions in such areas as “comprehensive training programs.” Note that assessments may also cite noteworthy practices related to training.

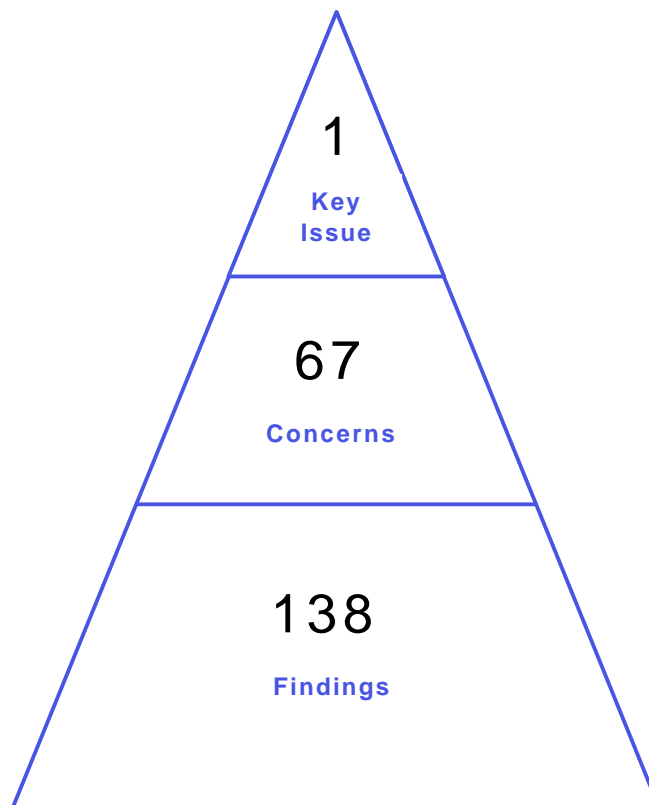


Figure 9

Oversight information typically provides broad guidance to the designer or evaluator of training programs as compared to the more specific field oriented guidance provided by actuarial data.

Table 3 shows the distribution of concerns related to training. This type of distribution can help the evaluator identify areas of emphasis in the oversight concerns related to training (e.g., emergency response training). The detailed findings leading to these concerns can also be retrieved from FPIMS to provide additional insight. See **Appendix A** for a listing of noteworthy practices, key issues, concerns, and findings related to LANL training.

Table 3. General Areas of Assessment Team Concerns Related to Training.

Performance Objective	Number of Concerns Relating to Training
AS - Aviation Safety	
AS.1 - Organization and Administration	1
AS.2 - Operation	1
AS.3 - Maintenance	1
AX - Auxiliary Systems	
AX.6 - Vital Supply Systems	1
CS - Nuclear Criticality Safety	
CS.1 - Organization and Administration	1
EP - Emergency Preparedness	
EP.2 - Emergency Plan and Implementing Procedures	1
EP.3 - Emergency Response Training	4
ES - Explosives Safety	
ES.4 - Explosives Safety Training	1
FP - Fire Protection	
FP.6 - Fire Department Operations	1
MA - Maintenance	
MA.2 - Conduct of Maintenance	2
MS - Medical Services	
MS.1 - Organization and Administration	1
NP - Natural Phenomena Hazards	
NP.1 - Natural Phenomena Hazards Safety Program	1
OA - Organization and Administration	
OA.8 - Fitness for Duty	1
OP - Operations	
OP.6 - Operator Knowledge and Performance	1
PT - Packaging and Transportation	
PT.2 - Training	4
QV - Quality Verification	

Performance Objective	Number of Concerns Relating to Training
QV.1 - Quality Program	1
RP - Radiological Protection	
RP.1 - Organization and Administration	2
RP.8 - Fixed and Portable Instrumentation	1
SS - Security/Safety Interface	
SS.4 - Safety of Security Activities	3
TC - Training and Certification	
TC.1 - Organization and Administration	7
TC.2 - Reactor Operations	4
TC.3 - Nuclear Facility Operations Other Than Reactors	4
TC.4 - General Employee/Personnel Protection Training	8
TC.5 - Maintenance Personnel	4
TC.6 - Criticality Safety	1
TC.7 - Training Facilities and Equipment	1
TC.8 - Quality Control Inspector and Nondestructive Examination Technician	1
TC.9 - Radiological Protection Personnel	1
TC.10 - Training for Supervisors, Managers, and Technical Staff	3
TC.11 - Simulator Training/Facility Exercises	2
TS - Technical Support	
TS.1 - Organization and Administration	1
WS - Worker Safety and Health (OSHA) Compliance	
WS.3 - Compliance with Occupational Health Standards for General Industry	1

As one proceeds with further analysis, these broad findings related to training needs may be related to more field specific actuarial data.

ORPS - ORPS Occurrences Indicating Training as a Causal Factor

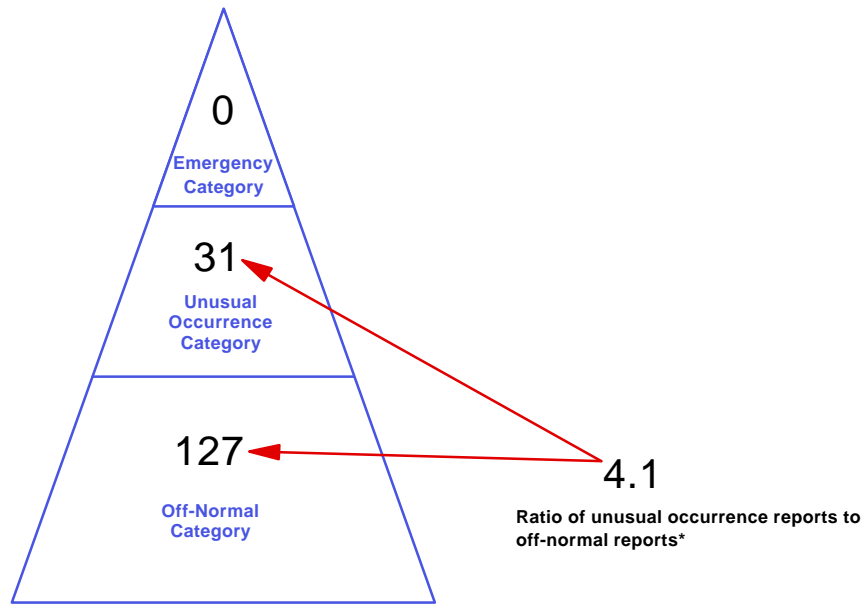
The Occurrence Reporting and Processing System's (ORPS) high reporting volume and sophisticated occurrence classification scheme make it a useful support tool for design and evaluation of training programs. **Table 4** indicates the role of training as a causal factor in LANL occurrences reportable under DOE Order 232.1 in terms of five basic failure modes:

- (a) No training provided
- (b) Insufficient practice or hands-on experience
- (c) Inadequate content
- (d) Insufficient refresher training
- (e) Inadequate presentation or materials.

Table 4. Distribution of LANL Causal Factors by Causal Factor Classification.

Training Deficiency	Direct Cause	Contributing Cause	Root Cause	Total
No Training Provided	3	49	8	60
Insufficient Practice or Hands-on Experience	1	25	4	30
Inadequate Content	4	32	2	38
Insufficient Refresher Training	1	24	4	29
Inadequate Presentation of Materials	0	7	0	7
Total	9	137	18	164

ORPS reports listing training as a cause can be ordered in terms of importance, as shown in **Figure 10**. In addition, reports listing training as a cause can be trended to help the evaluator understand the nature of the variability of indicators that characterize present performance and to predict training failure modes in terms of future performance (see **Figure 11**). Frequently the study area can be scoped so that DOE or private sector comparisons can be performed.



* DOE-wide, the ratio of unusual occurrence reports to off-normals reports that list training as a cause is 5.3.

Figure 10. Distribution of LANL occurrence reports, listing training as a cause by category type.

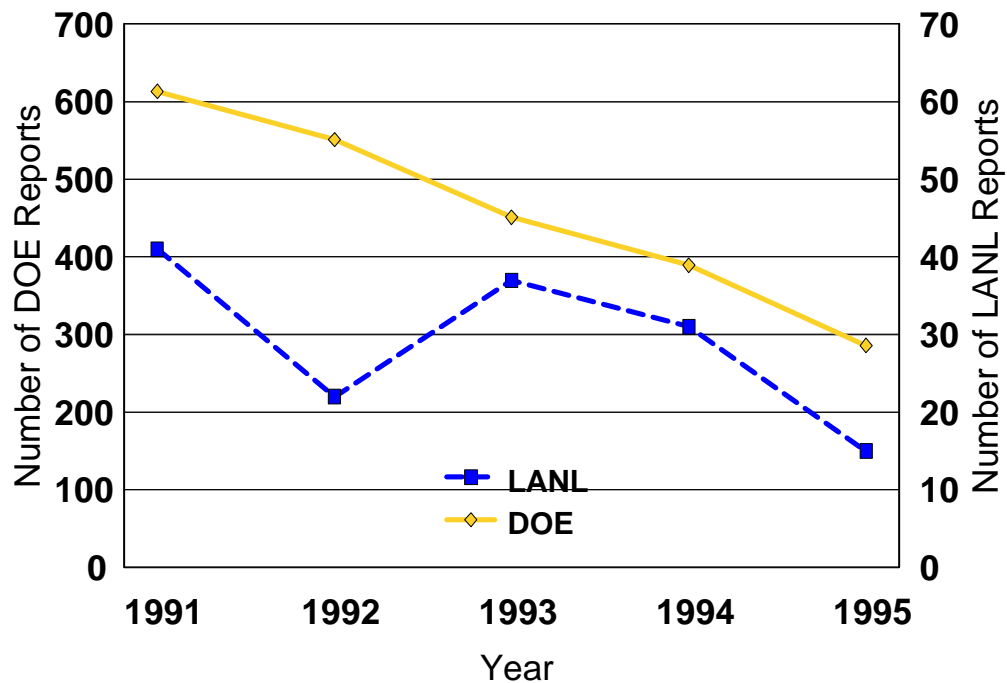


Figure 11. Trend of DOE and LANL occurrence reports, listing training as a cause, from 1991 through 1995.

The evaluator may also determine additional analysis is indicated for specific cause types. For example, occurrence reports listing training as a *direct cause* permits linking the training deficiency more closely with field activities, whereas occurrence reports listing training as a *root cause* generally involve training in a broader management control sense and effect of the reported deficiency may extend well beyond the specific event being reported.

Appendix B shows additional detail for LANL occurrence reports where training deficiencies were cited as either a direct or root cause. As previously stated, the classification scheme of ORPS enables the evaluator to view and evaluate the data from a variety of perspectives including:

- Nature of Occurrence. A distribution by nature of occurrence shows the types of things that are training issues.
- Facility. A distribution by facility shows the location where training issues emerge.
- Activity. A distribution by activity shows what activities are related to training deficiencies.
- Corrective Actions. As a tracking system, ORPS contains timely information pertaining to corrective actions. Corrective actions can assist the evaluator in determining the current state of the system under study.
- Narrative Information. ORPS is rich with qualitative narrative that is organized into logical categories (e.g., Description of Cause or Description of Occurrence).

CAIRS - Accidents Indicating Training as a Direct or Indirect Cause

CAIRS is a database used to collect DOE and DOE contractor reports of accidents that occur during DOE operations. The database contains all of the type A, B and C accident investigations submitted on DOE form 5484.3 in accordance with DOE Order 231.1 and previous DOE Order 5484.1. In addition, each reporting unit (DOE office or contractor organization) reports exposure data (work hours, vehicle miles, property valuation). Individual accident reports are complete from 1983 to present for injury/illness cases and for vehicle accidents. Property damage cases run from 1975 to the present.

Compared to ORPS, CAIRS supports simple causal factor classifications: Indirect and direct causes related to weather, design, procedures, employee, or other factors. Training inadequacies are usually reflected under the employee causal factor category. Therefore, one strategy for examining accidents with training causal factors is to extract accidents that indicate human error as a direct or indirect cause **AND** refer to training in the narrative description. **Figure 12** shows LANL 1990-1996 accidents, extracted using the logic explained above, ordered by investigation type.

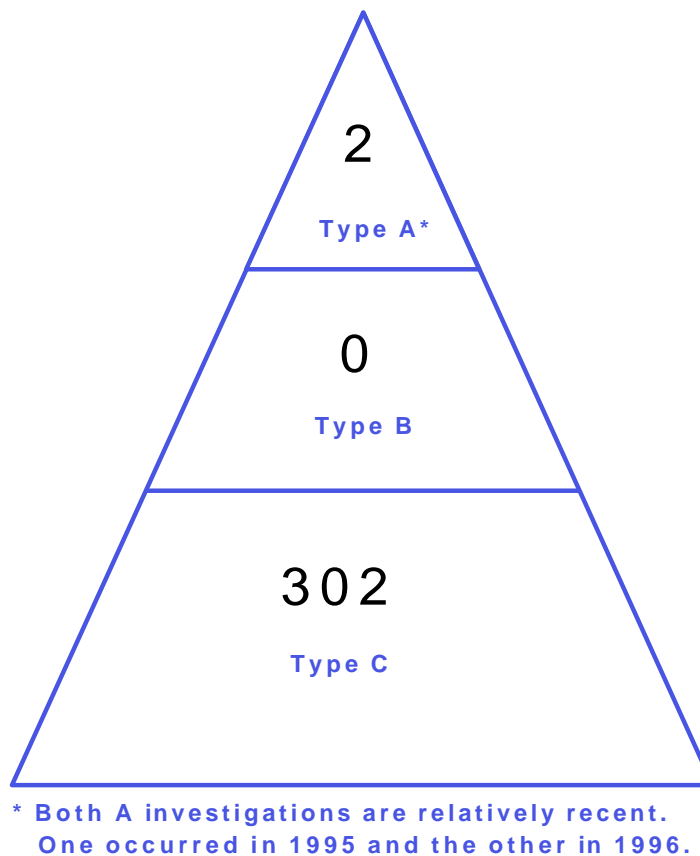


Figure 12. LANL training related accidents ordered by investigation type.

Unlike much of the information from many other sources, the CAIRS data is highly quantitative and may be linked directly with actual accident consequences in terms, for example, of dollar loss and/or work days lost or restricted. **Tables 5 and 6** display the summary of cost of LANL 1990-96 accidents that indicated human error as a direct or indirect cause and referred to training in the narrative description and **Table 7** displays costs by year.

Table 5. Summary of Days Away from Work and Restricted Workdays for Selected Cases.

Days	Total	Average	Maximum
Days Away from Work	704	3	116
Restricted Workdays	1,035	4	120
Total Lost Workdays	1,739	6	180

Table 6. Summary of Costs by Accident Type for Selected Cases.

Loss Type	Count	Total	Average	Case Maximum
Injury	271	\$ 2,160,000	\$ 7,970	\$ 550,000
Property	1	\$ 2,200	\$ 2,200	\$ 2,200
Vehicle	32	\$ 121,096	\$ 3,784	\$ 10,012
Total	304	\$ 2,283,296	\$ 7,511	\$ 550,000

Table 7. Cost by Year for Selected Cases.

Year	Cost
1990	\$ 763,224
1991	\$ 255,200
1992	\$ 133,076
1993	\$ 153,104
1994	\$ 356,784
1995	\$ 450,108
1996 ⁴	\$ 171,780

⁴ Cost for 1996 is through the 2nd quarter.

It is important to note that CAIRS is not a tracking system and therefore contains sparse information regarding corrective actions. Corrective actions information is limited to the immediate actions taken or actions recommended. However, referencing ORPS data for the same or similar occurrences can help the evaluator determine the current state of the system.

Appendix C shows the type of additional detail available from CAIRS for LANL accident reports where human error is cited as a direct or indirect cause and *training* is referred to in the narrative description. CAIRS quantitative structure enables the evaluator to view and evaluate the cost of accidents related to training from a variety of perspectives including:

- **Body Part Injured.** A distribution by body part injured shows both the frequency and severity of accidents associated with specific body parts.
- **Injury Type.** A distribution by injury type shows both the frequency and severity of accidents associated with specific injuries or illnesses.
- **Activity.** A distribution by activity type shows both the frequency and severity of accidents associated with generic activities.
- **Occupation.** A distribution by occupation type shows both the frequency and severity of accidents associated with generic occupations.
- **Equipment.** A distribution by equipment shows the frequency and severity of accidents associated with generic equipment types.
- **Narrative Information.** Both a one-line description of the accident and short accident narrative are available for each CAIRS case.

EXAMPLE 2

This example illustrates the process used to identify the role of training in already known problem areas. For this example, the problem area is defined as slips/trips/falls in construction. To isolate the area of interest, sequential searches of CAIRS and ORPS will be performed (see **Figure 13**).

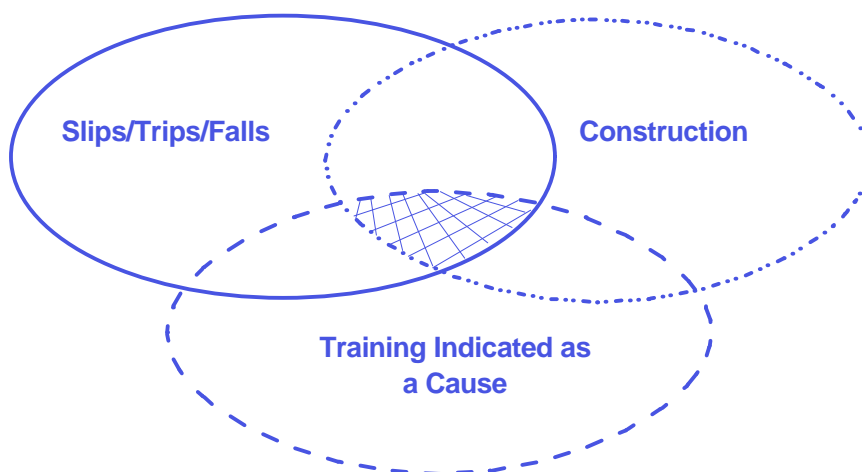


Figure 13. Defining the study area using slips/trips/falls, construction, and training as the special subject parameters.

ORPS - Occurrences reflecting specified parameters

A total of 37 occurrence reports were retrieved from the following criteria (see **Figure 14**):

- *Slip, trip, fall, or fell* in the description of occurrence narrative
- Construction activity category
- Training deficiency cited as a root, direct, or contributing cause

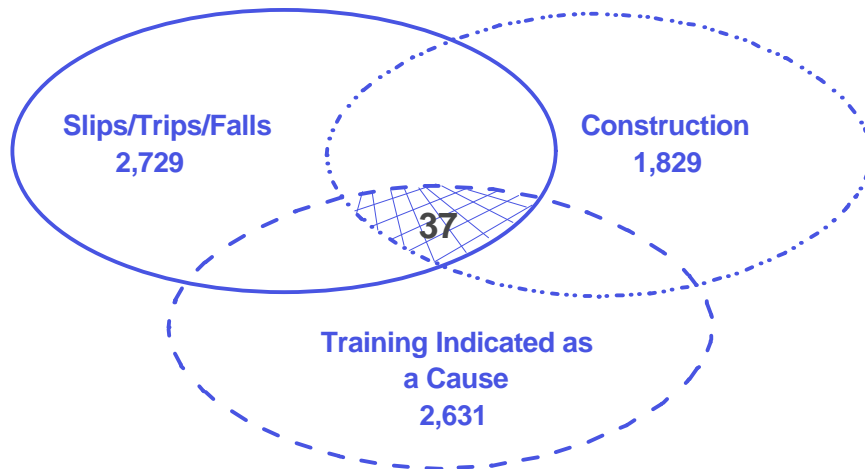


Figure 14. Identification of occurrence reports based on special subject parameters.

These occurrences can be ordered in terms of importance (**Figure 15**) or examined in an administrative area of interest (**Table 8**). The ORPS subject report is presented in **Appendix D**.

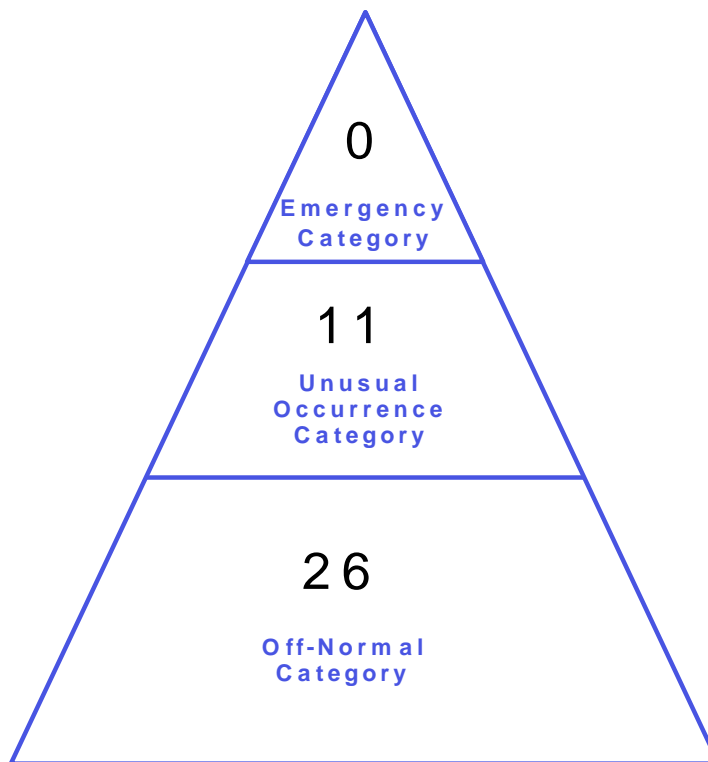


Figure 15. Listing of occurrence reports meeting special subject criteria by category type.

Table 8. Occurrence Report Distribution by Contractor Organization.

Contractor	Number of Occurrence Reports
MK Ferguson of Idaho Company	10
Los Alamos National Laboratory	4
MK Ferguson	4
Westinghouse Hanford Company	3
Pacific Northwest National Lab.	2
Westinghouse Savannah River Company	2
Ames Laboratory	1
Argonne National Laboratory - East	1
Argonne National Laboratory - West	1
EG&G Idaho, Inc.	1
EG&G Rocky Flats	1
Albuquerque Operations	1
Reynolds Elec & Engr Co	1
Sandia National Laboratories	1
Strategic Petroleum Reserves	1
Stanford University	1
Universities Research Association	1
West Valley Nuclear Services, Inc.	1

CAIRS - Accidents occurring from 1990 through 1996 reflecting specified parameters

A total of 17 injury accident reports were retrieved from the following criteria (see **Figure 16**):

- *Slip, trip, fall, or fell* in the accident narrative
- Construction activity type
- Human error as a direct or indirect cause and *training* in the accident narrative

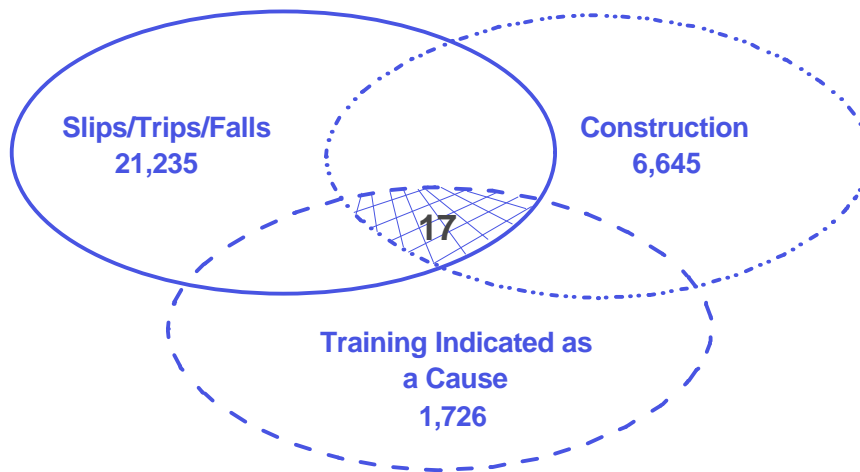


Figure 16. Identification of accident reports based on special subject parameters.

These accidents can be ordered in terms of importance (**Figure 17**) or examined in terms of cost (**Tables 9, 10, and 11**). The CAIRS one-line description report is presented in **Appendix D**.

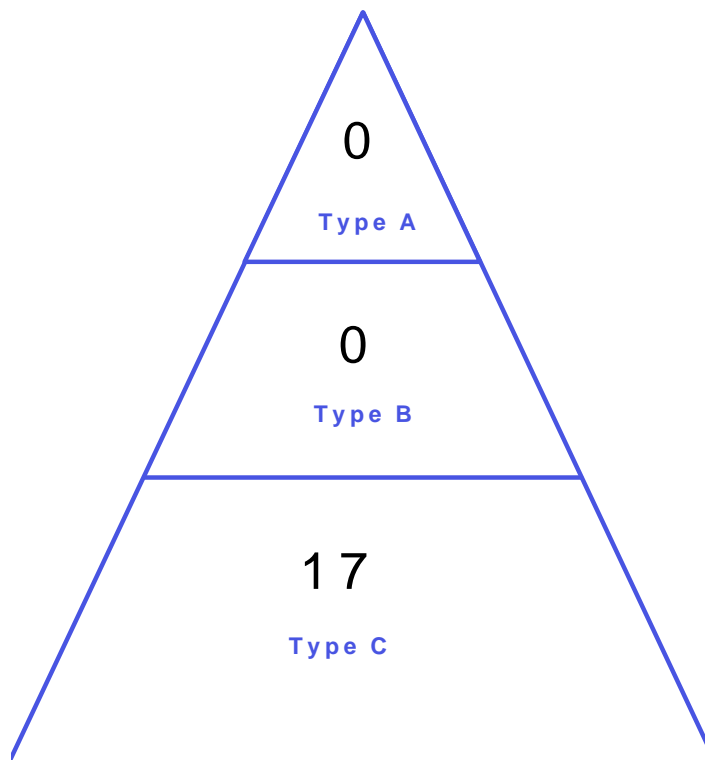


Figure 17. Listing of accident reports meeting special subject criteria by investigation type.

Table 9. Summary of Days Away from Work and Restricted Workdays for Selected Cases.

Days	Total	Average	Maximum
Days Away from Work	48	3	38
Restricted Workdays	201	12	122
Total Lost Workdays	249	15	122

Table 10. Summary of Costs by Accident Type for Selected Cases.

Loss Type	Count	Total	Average	Case Maximum
Injury	17	162,400	9,553	50,800

Table 11. Costs by Year for Selected Cases.

Year	Cost
1990	\$ 9,000
1991	\$ 6,000
1992	\$ 96,800
1993	\$ 12,000
1994	\$ 4,000
1995	\$ 34,600
1996 ⁵	\$ 0

⁵ Cost for 1996 is through the 2nd quarter.

APPENDIX A

List of key issues, concerns, findings, and noteworthy practices related to training from the November 1991 Baseline Compliance Assessment of the Los Alamos National Laboratory.

KEY ISSUES

- AL, LAAO, and LANL have not developed comprehensive, integrated ES&H training programs that include adequate planning, controls, documentation, and a validation process. AL, LAAO, and LANL have some elements of an ES&H training program; however, each of the programs are deficient in that they lack formality, consistency, and do not contain sufficient depth to assure that members of both staff and line organizations have been properly indoctrinated and trained to uniformly interpret and apply DOE policies, regulations, and standards in the performance of their day-to-day responsibilities.

The current LANL ES&H training program is largely decentralized, is not well integrated and many elements are poorly documented. It is difficult to determine whether individuals working in a potentially hazardous area have received requisite specialty training as well as site-specific indoctrinations. Moreover, many of the records do not reflect schedules for updated or refresher training, and virtually none of the decentralized systems contain provisions for validating the effectiveness of the training that has been provided. Since the training program is essentially decentralized, there is no effective mechanism to assure that all occupants of a multiprogram facility have been properly indoctrinated and trained to recognize and respond to ES&H hazards which might be encountered.

ES&H training programs developed by the two major onsite LANL subcontractors have similar deficiencies, and it does not appear that any attempt has been made to coordinate the collective efforts or requirements of the participating organizations. For example, LANL policies require that all personnel working in high risk areas receive site-specific training. However, the majority of the security force employed by Mason & Hanger have not received site-specific training even though they regularly operate fixed guard stations and roving patrols in all of these areas. Even more importantly, these employees have not been trained in the potential ramifications of discharging a firearm in the vicinity of reactor facilities or those containing high explosives.

As a further example, the fire fighters employed by Los Alamos County under a prime contract with DOE have not received adequate specialty training to enable them to properly respond to a structural fire in facilities that contain large concentrations of chemicals, high explosives, or radioactive materials.

The absence of a well-documented and effective training program within LANL was a significant concern to each of the TSA teams and the Environmental Subteam.

CONCERNS AND FINDINGS

CONCERN: The Los Alamos Area Office has not ensured that all airport fire (TSA-4) and rescue personnel are trained as required by 14 CFR 139.319 and (AS.1-7) the Los Alamos Airport Certification Manual.
(H2/C2)

CONCERN: The Ross Aviation, Inc., documentation of windshear ground and (TSA-4) flight training does not assure that the requirements of 14 CFR (AS.2-3) 121.409, 121.419, 121.424, and 121.427 have been achieved.
(H2/C2)

CONCERN: Ross Aviation, Inc., has not complied with aircraft maintenance (TSA-4) personnel training requirements of 14 CFR 121.375.
(AS.3-6)
(H3/C2)

CONCERN: A formalized program has not been established for training, (TSA-3) operation, or surveillance required to maintain auxiliary (AX.6-1) power supply equipment for the Ion Beam Facility at Los (H2/C2) Alamos National Laboratory

CONCERN: The Los Alamos National Laboratory training program for (TSA-1) personnel concerned with nuclear criticality safety does not (CS.1-4) satisfy all requirements of DOE 5480.5, Section 10.
(H3/C1)

FINDINGS:

- AL stopped doing periodic appraisals of nuclear criticality safety in 1985. There is, however, an agreement between LANL and AL that specifies the frequency of such appraisals. The maximum interval between appraisals as specified in the agreement is 2 years. This agreement has never been rescinded.

- AL 5480.5 does not specify the appraisals required by DOE 5480.5, Section 7.e.(9). Further, AL 5480.5, Section 4.c.(7) states that AL is to conduct appraisals in accordance with DOE 5482.1B. DOE 5482.1B, Section 8.3.(2) requires functional appraisals "with sufficient scope and frequency."
- The AL Operational Surety Program specifies daily, weekly, and monthly duties of facility representatives. Some of these duties relating to nuclear criticality safety are not being discharged.
- The AL OSR Assistance Review document states that the November 1989 OSRs for TA-55 were to receive priority for approval. Further, AL 5480.5, Section 4.f.(2).(b) states that OSR are to be approved by the Director, Safety Programs Division. "Operational Safety Requirements for the Plutonium Facility (TA-55-4)," November 1989, does not indicate that such approval was obtained.
- Distribution of unusual occurrence notices by AL has not been formalized and is inconsistently performed.
- See Concern TSA-1, OA.7-2.
- The following concern was not identified in the AL self-assessment.

CONCERN: Guidance and training have not been provided to facility (TSA-4) emergency management as required by DOE 5500.1B and (EP.2-2) DOE 5500.3A (and its predecessor DOE 5500.3) on preparation, (H2/C1) development, and drafting specific facility and building emergency response plans and procedures.

FINDINGS:

- The Emergency Management Office has not developed a site evacuation plan for use during emergencies, nor has it conducted an exercise to test this plan. EIPs for area or facility evacuation, assembly, and accountability have not been developed or reviewed.
- See Concern TSA-4, EP.1-1.
- The following concern was identified in the LANL self-assessment.

CONCERN:At the Los Alamos National Laboratory, the TA-55 training program
(TSA-1) and implementation of training activities do not meet the
(EP.3-1) requirements of DOE 5500.3A (and its predecessor DOE 5500.3);
(H2/C1) furthermore, the management and support personnel have not been
trained in emergency management requirements and responsibilities
outlined in DOE 5500 series of Orders.

CONCERN:The Design Engineering Division at Los Alamos National
(TSA-2) Laboratory has not provided sufficient emergency response
(EP.3-1) team training for all members of the Division emergency
(H1/C1) response organization as required by DOE 5500.3A (and its
predecessor DOE 5500.3).

CONCERN:The Clinton P. Anderson Meson Physics Facility and the Ion
(TSA-3) Beam Facility at Los Alamos National Laboratory have not
(EP.3-1) implemented training programs and activities to meet the
(H2/C1) requirements of DOE 5500.3A (and its predecessor DOE 5500.3);
furthermore, management and support personnel at these
facilities have not been trained in emergency management
requirements and responsibilities outlined in the DOE 5500
series of Orders.

CONCERN:Los Alamos National Laboratory does not have an emergency
(TSA-4) preparedness training program document that addresses
(EP.3-1) training requirements by emergency position, instructors
(H1/C1) qualification, and annual training requalification
requirements established in DOE 5500.3A.

CONCERN:The explosives training and qualification program of the Los Alamos
(TSA-4) National Laboratory does not comply with the requirements and scope
(ES.4-1) specified by Chapter V, DOE/EV/06149, Explosives Safety Manual.
(H2/C1) (Also see Concern TSA-4, TC.1-1.)

CONCERN:Los Alamos Area Office has not assured that the Los Alamos County
(TSA-4) Fire Department is provided with a level of training which permits
(FP.6-1) the Department to safely mitigate fires involving hazardous
(H1/C2) materials or hazardous operations.

FINDINGS:

- A mutual aid agreement for the control of wildland fires exists between the Bureau of Indian Affairs, the DOE, the Forest Service, the National Park Service, and the New Mexico Department of Natural Resources.
- A mutual aid agreement does not exist between LAAO and local community fire departments.

- During the appraisal emergency exercise which was conducted at TA-54 on October 28, 1991, the Fire Department activated its personnel call-back system of off-duty firefighters. Only four firefighters responded to the call-back.
- Neither the current contract or the proposed contract for fire department services with Los Alamos County, fire department directives, or DOE guidance requires that a minimum level of fire apparatus and personnel be held in reserve for response to LANL facilities in the event of a fire. Under the current arrangement, all on-duty firefighting forces could be committed to a major structural fire within the Town of Los Alamos. Located within the Town of Los Alamos are numerous large structures which would require considerable resources (manpower and equipment) in order to extinguish or confine the fire to the building of origin.
- The 1989 Factory Mutual Fire Protection Survey stated "In addition, due to the proposed change from a DOE department to a County department an SOP should be established that would require a minimum level of available equipment and personnel that the County must maintain in Stations FS-1 and FS-5 to assure protection to LANL buildings."
- No onsite facility for extensive live fire training exist. This issue was also addressed in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."
- The following concern was identified in the AL "Special Report on Issues Related to The Operation of the Los Alamos Fire Department."
- The following concern was not identified in the LAAO self-assessment.

CONCERN: At Los Alamos National Laboratory, the maintenance training (TSA-2) programs and training records for operators working on (MA.2-1) program (Class B) equipment at tritium and reactor facilities (H2/C1) do not meet the requirements of DOE 4330.4A.

FINDINGS:

- There is no independent verification of maintenance work

by the operators on program (Class B) equipment for Los Alamos Critical Experiments Facility at Los Alamos National Laboratory.

- No independent verification of the satisfactory completion of maintenance work is conducted at the Tritium Salt Facility.

CONCERN: Welders who have not been trained and certified are
(TSA-3) performing work on programmatic (Class B) equipment for
(MA.2-2) accelerator facilities at Los Alamos National Laboratory.
(H2/C2)

CONCERN: Medical personnel at Los Alamos National Laboratory are not
(TSA-2) fully trained, and the training program is not documented in
(MS.1-3) accordance with 29 CFR 1910.120.
(H1/C1)

CONCERN: Personnel training, documented plans, and defined procedures
(TSA-1) necessary for response to a design basis earthquake are not
(NP.1-1) in place at TA-55 Building PF-4; TA-55 Building PF-3, rooms
(H1/C2) 116 and 117; and TA-3, Building SM-66 at Los Alamos National
Laboratory.

FINDINGS:

- Facility hazard classifications are based on methods that have not been approved by DOE. These include several site-specific assumptions involving unmitigated release calculations.
- The hazard classification of the Chemistry and Metallurgical Research Building as moderate hazard does not consider personnel located at the building boundary for the duration of the accident.
- In accordance with the draft hazards classifications document, with no mitigating considerations taken for hazards, the Chemistry and Metallurgical Building would be classified as a high-hazard building.
- The method for evaluating radiological hazards was sent to the AL prior to October 1990. The hazard classifications document, including toxicological hazards, was submitted in September 1991. DOE has not concurred yet with the proposed methodology or the facility classifications cited in the draft.

- DOE is currently funding programs to review the LANL draft hazards classifications document.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: Not all management personnel and staff at Los Alamos National
(TSA-2) Laboratory have received training on the drug-free workplace
(OA.8-2) and Employee Assistance Program, and there is no documented
(H2/C2) requirement that such training will continue to ensure
periodic refresher training.

CONCERN: The Los Alamos Area Office facility representative has not been
(TSA-1) provided facility-specific training to promote effective oversight
(OP.6-1) of the Los Alamos National Laboratory TA-55 operations in
(H3/C1) compliance with DOE 5480.19.

CONCERN: At the Los Alamos National Laboratory, the training program
(TSA-1) for preparation of packages of plutonium and enriched uranium
(PT.2-1) products by the Nuclear Materials Management Group does not
(H2/C1) meet the requirements for quality assurance in the use of
packagings per DOE 5480.3.

CONCERN: The Los Alamos National Laboratory has not established a
(TSA-2) packaging and transportation training program to meet
(PT.2-1) DOE 5480.3, 49 CFR, or ASME NQA-1-1989.
(H2/C1)

CONCERN: At the Los Alamos National Laboratory, formal training and
(TSA-3) qualification programs are not in place in the accelerator
(PT.2-1) areas for packaging and transportation employees to perform
(H2/C1) their duties as required by DOE 5480.3 and by 49 CFR 100-199
and 391-396.

CONCERN: Los Alamos National Laboratory does not conduct and document
(TSA-4) packaging and transportation training and has not set
(PT.2-1) sitewide training and qualification standards for packaging
(H1/C1) and transportation employees in accordance with DOE 5480.3,
DOE 5480.20, DOE 5610.1, 49 CFR, 40 CFR, 29 CFR, and ASME
NQA-1-1989.

CONCERN: The organizations responsible for accelerator operations do
(TSA-3) not have trained quality assurance professionals to ensure
(QV.1-2) that quality assurance plans are developed and implemented as

(H3/C2) required by the Los Alamos National Laboratory Quality Program Plan, dated March 29, 1989.

CONCERN: Los Alamos National Laboratory radiation protection technicians have not been trained to meet minimum requirements specified in DOE 5480.11.
(TSA-2)
(RP.1-1)
(H2/C1)

FINDINGS:

- At the Ion Beam Facility, where an incident occurred during this appraisal, the responsibilities of the radiation protection technician are divided among seven buildings. Line management has requested full-time support at this facility.
- Management personnel at several facilities complained that they do not get radiation protection technicians assigned to their facilities in response to their requests.
- Approximately 100 radiation protection instruments are out of calibration at one building. One of the explanations for not returning the instruments for recalibration was the amount of time required.
- The number of tritium smears that are counted has increased by 75 percent over the past 3 years. It takes from 2 to 5 weeks to get the smear processed. Currently, there is a backlog of nearly 3000 samples even though at least one-half person year in overtime is being expended.
- A counting room used in the smear- and air-sample counting laboratory is located in a hallway between two rooms in which smearable contamination exceeds the limits specified by DOE 5480.11, Appendix 2. The presence of alpha contamination in the counting room could bias results or could result in the room being shut down. This is reportedly the only space available for this valuable, important resource for the contamination control program. In comparison, in the counting room at TA-55 Bldg. PF-4, only clean protective clothing is permitted and the area is not a contaminated area.
- Approximately 12 temporary radiation protection technicians are being used by LANL to supplement the available staff of radiation protection technicians.

These temporary radiation protection technicians are required to provide valuable health physics support with only limited plant-specific training.

- The calibration of high-level, portable, fixed radiation (TA-2) and criticality (TA-55) detection instruments cannot be properly performed because of the limited dose rate available in the old LANL calibration facility.
- The health physics groups have identified the shortfall of people and facility resources through their organization self-assessment.
- Line management oversight of the LANL Radiation Protection Program for radiation-producing devices does not ensure that all requirements of mandatory standards in DOE 5480.11 are implemented. Responsibility is not defined or assigned to ensure that the radiation safety officer and qualified expert requirements associated with accelerators and radiation-producing machines are implemented in accordance with ANSI 43.1, ANSI 43.2, and ANSI 43.5. (See Section 4.5.3.13.2, RP.1.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN: Training of radiation protection technicians and radiation workers at facilities with radiation-producing devices does not meet the requirements of DOE 5480.11 and Los Alamos National Laboratory AR 3-1.

FINDINGS:

- Shielding initially installed over Line D at LAMPF was not designed to provide radiation protection for a maximum credible accident.
- Shielding at the LANSCE Target 1 Service Area is not designed to provide radiation protection for a maximum credible accident.
- See Concern TSA-3, OP.2-1.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: Procedures and training to control the use of portable health physics survey instruments by line personnel are not in place at some Los Alamos National Laboratory accelerator facilities to ensure that the monitoring requirements of DOE 5480.11 and DOE 5400.5 are met.

(TSA-3)
(RP.8-1)
(H2/C1)

CONCERN: Protective force personnel have not received training in the potential consequences of using weapons and other protective force equipment in the vicinity of safeguarded systems or components, and hazardous materials and processes at Los Alamos National Laboratory facilities.

(TSA-4)
(SS.4-1)
(H1/C2)

FINDINGS:

- Security inspectors do not receive facility-specific training in chemical, radiological, and other hazards to which they might be exposed in LANL plutonium and enriched uranium facilities. (See Section 4.5.1.11.2, SS.4.)
- Hazard training specific to TA-53 is not provided to the protective force personnel who serve the area. (See Section 4.5.3.10.2, SS.4.)
- Chemical, radiological, and other hazards to which protective force personnel might be exposed during normal or emergency response entry have not been systematically identified for most other LANL facilities. Such information is necessary before effective facility-specific training on how to avoid the hazards can be performed.
- LANL has initiated a "Precinct Program" to group facilities, identify hazards for each group, and provide facility-specific training for protective force personnel and others. The program, however, is still in a formative stage.
- See Concerns TSA-1, WS. 3-1; TSA-1, TC.4-1; TSA-1, SS.4-2; TSA-4, FP.6-1; and TSA-4, FP.6-11; and Sections 4.5.1.5.2, TC.1; 4.5.1.11.2, SS.4; and 4.5.1.16.2, WS.3.
- The following concern was identified in the LANL self-assessment.

CONCERN: Protective force personnel do not receive facility-specific training in the chemical, radiological, and other hazards to which

(TSA-4)

(SS.4-2) they might be exposed in most Los Alamos National Laboratory
(H1/C2) facilities.

FINDINGS:

- Protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to emergencies at LANL plutonium and enriched uranium facilities. (See Section 4.5.1.11.2, SS.4.)
- M&H personnel, including the Chief Training and Operations Officer, stated that protective force personnel are not provided with or trained in the use of equipment for protection against radioactive and hazardous materials that might be encountered when responding to facility emergencies.
- See Section 4.5.1.16.2, WS.3.
- The following concern was identified in the LANL self-assessment.

CONCERN: Protective force personnel are not provided with or trained in the
(TSA-4) use of equipment for protection against radioactive and hazardous
(SS.4-3) materials that might be encountered when responding to emergencies
(H1/C2) at Los Alamos National Laboratory facilities.

FINDINGS:

- The M&H protective force organization at LANL has experienced a total of 39 Lost Workday Cases (LWCs) for CY 91 through September. These data yield an LWC Incidence Rate of approximately 10.4 (total personnel ~500).
- The M&H/Los Alamos average LWC Incidence Rate for the last 5 years (1986-1990) was 7.6. The comparable figure for all DOE security contractors was 2.8, and the average LWC Incidence Rate for total DOE and contractors for the same period was 1.3.
- Of the 39 LWCs recorded this year for M&H, 19 were attributable to physical training activities, and of these 12 occurred at facilities of the Los Alamos Wellness Center.

- Data on the number of Total (OSHA) Recordable injuries and on the total number of Lost Workdays follow the same trends as those for the LWCs.
- Discussions with LANL and M&H management personnel did not indicate that any initiatives were being pursued to address the abnormally high incidence of injuries to protective force personnel, although a review of several documented reports and safety meeting minutes revealed that the LANL Operational Security and Safeguards Division and M&H personnel were aware of the problem.
- The following concern was not identified in the LANL self-assessment.

CONCERN: At the Los Alamos National Laboratory, oversight and control functions of training activities in the Nuclear Materials Technology Division fail to meet the requirements of DOE 5480.5, such as recordkeeping, auditability, verification of training, and so forth.

(TSA-1)
(TC.1-1)
(H2/C1)

CONCERN: At Los Alamos National Laboratory, the Tritium Salt Facility and the Weapons Engineering Tritium (Test) Facility have not provided training plans to ensure that each employee is properly trained to perform his or her assigned tasks safely as required by DOE 5480.5 and DOE 5480.20.

(TSA-2)
(TC.1-1)
(H2/C1)

FINDINGS:

- LANL has installed a sitewide, computer-based Employee Development System for tracking, scheduling, and documenting training.
- Records are being maintained in a variety of manners, for example:
 - The Tritium Systems Test Assembly maintains a facility computer record of training conducted.
 - The Tritium Salt Facility does not maintain a facility computer record.
 - The Quality Operations Office maintains both Tritium Systems Test Assembly and Tritium Salt Facility training records, both in hard copy and in a computer based record.

- The Tritium Systems Test Assembly and Tritium Salt Facility do not use the Employee Development System for all training record documentation.
- The draft LANL training manual requires the use of the Employee Development System for documenting conducted training.
- Several facility training coordinators have reported that they do not use the Employee Development System because it does not meet their needs, because they do not trust the system, or because they do not know how to use it.
- LANL does not trend facility training to ensure facilities are meeting their training commitments.

CONCERN: The Los Alamos National Laboratory accelerator organizations (TSA-3) have not established training and qualification/certification (TC.1-1) requirements that are based on assigned job tasks for each (H2/C2) work classification.

FINDINGS:

- Most accelerator facilities do not formally document on-the-job training.
- LANL established a centralized training record system, the Employee Development System, in April 1991. Users of the system still consider records on the system to be incomplete and unreliable.
- See findings in support of Concern TSA-3, AX.6-1.

CONCERN: Los Alamos National Laboratory has not implemented a (TSA-4) comprehensive program for training as required in (TC.1-1) DOE 5480.20. (H2/C1)

FINDINGS:

- Although the Employee Development System (EDS) training recordkeeping system has been under development for 4 years, it is not yet fully functional.
- The EDS can produce individual training records but currently cannot produce reports on job codes or work groups required by some line divisions.

- DOE 5480.11 and DOE 5480.20 require that LANL ensure that workers in particular job codes or work locations are trained.
- The line divisions within LANL do not have agreement on course titles, objectives, or technical content for similar instruction taught across divisions. Therefore, EDS or division records have limited usefulness in monitoring training.
- The LTO and the Safety and Risk Assessment Group do not formally monitor line division training courses.
- LANL management has not yet established procedures for the use of EDS as a tool for ensuring compliance with job-related training.
- LANL has not developed the comprehensive system for training records it requires. For example, LANL has not determined whether or not all non-employees working at LANL will be trained by LANL or will be audited by LANL to ensure compliance with required ES&H training.
- No quality verification has been completed on the EDS training records by the group, the LTO, or the employee.
- See Concerns TSA-4, QV.1-5, and TSA-2, OA.5-2.
- Training record documentation is not maintained or trended in a unified or consistent manner for workers at the Tritium Systems Test Assembly and the Tritium Salt Facility. (See Section 4.5.2.5.2, TC.1.)
- At most Los Alamos National Laboratory accelerator facilities, participation and performance records related to training are not maintained in an auditable manner. (See Section 4.5.3.5.2, TC.1.)
- Training records for certified operators at the Tritium Systems Test Assembly and the Los Alamos Critical Experiments Facility are not required to be validated to ensure that all specified training is accomplished prior to certification. (See Section 4.5.2.5.2, TC.1.)
- The following concern was partially identified in the LANL self-assessment.

CONCERN:Weapon Subsystems Group personnel at Los Alamos National
(TSA-2) Laboratory are not being trained in accordance with the
(TC.1-2) Design Engineering Division training plan, DOE 5480.5, and
(H2/C1) DOE 5480.20.

FINDINGS:

- An internal validation of required training accomplishment for all certified operators has not been conducted.
- The Tritium Systems Test Assembly training plan does not provide any requirement to validate all specified training is completed prior to operator certification.
- An inspection of certified operator training requirements, as prescribed by the facility training plan, indicated that one operator at the LACEF had not accomplished all specified training.

CONCERN:The organizational structure and training system at Los
(TSA-3) Alamos National Laboratory, including responsibilities and
(TC.1-2) authorities of personnel involved in managing, supervising,
(H2/C2) and implementing training, is neither well defined nor well understood by personnel in accelerator organizations.

CONCERN:The Los Alamos National Laboratory does not have an effective
(TSA-4) and comprehensive training recordkeeping system to monitor
(TC.1-2) whether employees and onsite workers have fulfilled
(H2/C2) environment, safety, and health training requirements necessary to comply with DOE 5480.11 and DOE 5480.20.

CONCERN:Contrary to the requirements of DOE 5480.19, general training
(TSA-2) classes conducted in the control room of Los Alamos National
(TC.2-1) Laboratory Omega West Reactor during reactor operation
(H2/C1) distract the operator from his or her primary function of "at the controls" operation of the reactor.

FINDINGS:

- Written examinations for certifying operators at the LACEF are subjective.
- No predetermined elements for correctness of answers have been established.
- Records of oral examination questions are not maintained.

- The following concern was identified in the LANL self-assessment.

CONCERN:At Los Alamos National Laboratory, examinations to certify
(TSA-2) operators for Los Alamos Critical Experiments Facility do not
(TC.2-2) ensure a consistent minimum level of expertise from one
(H3/C2) examination to the next, and the content of oral examinations
is not documented.

FINDINGS:

- The training required by the LACEF training plan has not been accomplished.
- An inspection of training records maintained by one certified operator indicated that four training modules had not been completed as required by the LACEF training plan. Provisions to correct this training deficiency were in progress during this appraisal.
- The following concern was not identified in the LANL self-assessment.

CONCERN:At Los Alamos National Laboratory, not all certified
(TSA-2) operators are trained as required by DOE 5480.20 and the Los
(TC.2-3) Alamos Critical Experiments Facilities training plan.
(H2/C1)

FINDINGS:

- The LACEF (TA-18) does not use lesson plans for the classroom phase of operator training.
- A class outline, detailing the content for that class, is the generally accepted script the instructor uses to teach the subject.
- Outlines for two operator training classes (Operator Training Module 4 and Accidents and Operation of Mars Critical Assembly) were not available for inspection.
- The lack of lesson plans or course outlines can cause inconsistencies and possibly a failure to introduce essential information.
- The following concern was identified in the LANL self-assessment

CONCERN: Formal lesson plans or class outlines that detail specific
(TSA-2) learning objectives do not exist at Los Alamos Critical
(TC.2-4) Experiments Facility for some training classes.
(H3/C2)

CONCERN: At the Los Alamos National Laboratory, job-specific training within
(TSA-1) the Nuclear Materials Technology Division does not ensure that all
(TC.3-1) assigned workers have received training as required by DOE 5480.5;
(H2/C1) for example, there is insufficient documentation of job-specific
examinations, insufficient implementation of a formally documented
training program, and so forth.

CONCERN: Tritium Systems Test Assembly test directors at Los Alamos
(TSA-2) National Laboratory are not certified as required by DOE
(TC.3-1) 5480.5 and DOE 5480.20.
(H2/C1)

FINDINGS:

- Training examinations for Tritium Systems Test Assembly operators, technical staff, and maintenance personnel are not controlled or administered in a formal manner.
- No method is in place at the Tritium Systems Test Assembly to prevent examination compromise.
- Oral examinations are not documented.
- The following concern was identified in the LANL self-assessment.

CONCERN: The Tritium System Test Assembly staff at Los Alamos National
(TSA-2) Laboratory does not administer or control examinations in a
(TC.3-2) formal manner as required by DOE 5480.20.
(H3/C1)

FINDINGS:

- The training required by the recently developed and approved (September 24, 1991) Tritium Systems Test Assembly training plan has not been implemented.
- An inspection of one certified operator training record indicated that 13 training classes required by the new Tritium Systems Test Assembly training plan have not been completed.

- The Tritium Systems Test Assembly has not established a formal schedule to implement new required training.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: Not all subjects have been presented which are required in
(TSA-2) the training of certified operators at Tritium Systems Test
(TC.3-3) Assembly by the new facility training plan; no schedule has
(H3/C2) been formulated to implement this training at Los Alamos
National Laboratory.

FINDINGS:

- Tritium contamination is present in much of the Ion Beam Facility equipment.
- None of the personnel at this facility have received tritium worker training.
- Training records at the Ion Beam Facility show that one technician has not received radiation worker training and that one secretary has not successfully completed the radiation worker training course.

CONCERN: At the Los Alamos National Laboratory, the Nuclear Material
(TSA-1) Technology Division training program accreditation status is in
(TC.4-1) jeopardy if it must conform with the undeveloped sitewide training
(H2/C2) program.

FINDINGS:

- For TA-55 Phase I training, there are a limited number of written examination questions for each of the course topics. The examinations that are constructed from these questions are used repeatedly.
- Some of the TA-55 Phase I examination questions have discrepancies. Examples of identified discrepancies include implausible distractors, giveaway answers, and unclear or imprecise phrasing.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: Accelerator facility personnel at Los Alamos National
(TSA-3) Laboratory have not received the initial and continuing
(TC.4-1) safety training, including that required by DOE 5480.4 and

(H1/C1) DOE 5480.11.
CAT. II

FINDINGS:

- The LAAO has not assessed the training program for personnel at LANL accelerator facilities.
- The following concern was partially identified in the LAAO self-assessment.

CONCERN: Los Alamos National Laboratory has not fulfilled all the
(TSA-4) requirements for General Employee Training as specified in
(TC.4-1) DOE 5480.20 or radiation safety training as specified in DOE
(H2/C1) 5480.11.

FINDINGS:

- A 12-member LANL task force was chartered in late 1990 to determine whether a workforce basic skills (information-processing skills needed by workers to meet the requirements of the job) program was required by LANL. The evidence presented by members of the task force was anecdotal but serious in implication for both LANL and JCI. For example, 1500 of 4000 LANL employees failed the test given during the hazardous communication training course. The Chair of the task force briefed many LANL managers following the issuance of the March 1991 report. Based on the findings, a pilot training program is scheduled in 1992.
- JCI reported, as an example of literacy risks, that one of its building custodians was cited in an occurrence report involving chemical contamination of a laboratory. The custodian entered the contaminated laboratory even though the door was marked with a sign that stated "Do Not Enter."
- JCI recognizes that technical literacy in its custodian workforce is a problem. JCI is not required to inform LANL when an assigned custodian or craftworker might need special training to ensure safe performance.
- Five divisions, which were appraised, provided safety orientation and training on new safety and operating procedures solely by providing time for the employees to read the documents and sign their names. None of the five assigned training coordinators would confirm whether

all their division employees had the literacy to understand the technical procedures.

- In 1984-1988 the former Plutonium Division assisted by Human Resource Development trained materials handlers who lacked the basic technical literacy to perform required job duties. Extensive training in mathematics and chemistry was provided on Laboratory time for over a year to make approximately 25 technicians job competent. Training professionals interviewed who were involved in the materials handler training believed that similar deficiencies in employee competence currently exist.
- The following concern was partially identified in the LANL self-assessment.

CONCERN:At the Los Alamos National Laboratory, written examinations used
(TSA-1) during TA-55 training do not ensure that training material has been
(TC.4-2) mastered.
(H2/C2)

CONCERN:The Los Alamos Area Office has not enforced requirements to
(TSA-3) develop, conduct, or evaluate training for accelerator
(TC.4-2) facilities at Los Alamos National Laboratory.
(H2/C2)

CONCERN:The Los Alamos National Laboratory does not ensure that its
(TSA-4) employees or those of contractors or subcontractors have the
(TC.4-2) technical, environmental, safety, and health literacy
(H2/C2) required to mitigate risk to themselves or other Laboratory workers.

FINDINGS:

- The employee and visitor training and qualification programs at TA-55 are recognized as models by other DOE contractors. The Operational Security and Safeguards has a well-documented training program for materials custodians which requires LANL staff from many divisions to be certified. Most training coordinators interviewed had not examined these programs or materials for applicability to their needs.
- LANL is currently developing training to accompany the lockout/tagout procedure. JCI has implemented its own procedure. The Safety and Risk Assessment Group has not contacted JCI to determine lessons learned.

- Most of the training coordinators interviewed had not looked at training at other divisions to gain an insight into lessons for visitor control and site-specific training.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: The training expertise within Los Alamos National Laboratory (TSA-4) is infrequently used for lessons learned or for assistance in (TC.4-3) solving other sitewide training issues.
(H2/C3)

FINDINGS:

- The training manual issued by the LTO includes only training of employees and does not make explicit requirements for contract and subcontract employees.
- A review of Employee Development System training records of 221 contract workers assigned to LANL identified approximately 10 percent who had not received any health and safety training.
- The Quality Operations Office has a procedure to initiate the training requirements for contract personnel but lacks the authority to ensure that, once personnel are assigned within the divisions, the training requirements are met.
- The subcontract with Johnson Engineering, Subcontract No. 9-X-31-9276X-4, Sec IV, N and R (one of four companies currently providing 786 contract workers to LANL), contains clauses that it provide its employees with required ES&H training. Johnson Engineering has not provided documented ES&H training. Further, LANL has not audited the health and safety plans of companies providing contract workers to ensure that they are qualified.
- In contracting with individual consultants, LANL does not specify ES&H training requirements to be met for the individual or does not audit to verify that LANL-required training has been accomplished.
- The following concern was partially identified in the LANL self-assessment.

CONCERN: The Los Alamos National Laboratory does not ensure that
(TSA-4) contract or subcontract or employees working onsite have
(TC.4-4) received required health and safety training.
(H2/C2)

CONCERN: At the Los Alamos National Laboratory, oversight and control of
(TSA-1) training for maintenance personnel at TA-55 does not ensure that
(TC.5-1) they possess adequate knowledge and skills to safely and correctly
(H2/C1) complete assigned tasks as required by DOE 4330.4A and DOE 5480.5.

CONCERN: At Los Alamos National Laboratory, the Los Alamos Critical
(TSA-2) Experiments Facility does not document program (Class B)
(TC.5-1) equipment maintenance training as required by DOE 5480.6 and
(H3/C1) DOE 5480.20.

CONCERN: The Los Alamos National Laboratory subcontract evaluation
(TSA-4) process of Johnson Controls World Services, Inc., does not
(TC.5-1) contain definite criteria and accountability for training.
(H2/C2) (Also see Concern TSA-4, OA.1-2.)

FINDINGS:

- LANL and its subcontractor, JCI, are not in compliance with 29 CFR 1910, Subpart 5, Electrical. The code requires electrical training for both qualified and unqualified persons working in areas with significant electrical hazards. Training must include site-specific safety.
- See Concern TSA-4, WS.4-4.
- Although LANL has had several near-fatalities related to work involving electrical systems, including one 12 months ago, the first comprehensive Laboratory electrical safety awareness course was not begun until 1990. The Electrical Safety Awareness course curricula developed by a Laboratory committee has been taught to over 2000 LANL employees and contractors since November 1990. Currently, it is the only sitewide electrical safety course taught.
- LANL has many unique electrical systems which technicians and JCI craftworkers learn on the job. Many of the systems no longer have as-built drawings. However, site-specific training does not meet the requirements of 29 CFR 1910, Subpart S, Electrical.

- The following concern was partially identified in the LANL self-assessment.

CONCERN: Los Alamos National Laboratory has not developed and
(TSA-4) implemented training in electrical safety based on existing
(TC.5-2) safety risks and 29 CFR 1910, Subpart S, Electrical.
(H1/C1)

CONCERN: There is no documented program which ensures that all people
(TSA-4) who handle fissionable material at the Los Alamos National
(TC.6-1) Laboratory receive appropriate, job-specific criticality
(H1/C1) safety training as required by DOE 5480.5.

CONCERN: At the Los Alamos National Laboratory, lack of dedicated
(TSA-4) training facilities and equipment inhibits the ability to
(TC.7-1) conduct required environment, safety, and health training,
(H2/C2) including hands-on mastery of skills.

CONCERN: Los Alamos National Laboratory has not developed a training
(TSA-4) and qualification program for inspector and other quality
(TC.8-1) control personnel.
(H3/C2)

FINDINGS:

- The JCI procedure for training, qualifying, and certifying inspection personnel was only recently issued (October 21, 1991). Not all JCI staff have been trained on the procedure.
- The JCI procedure for training, qualifying, and certifying inspection personnel has not been reviewed by the Laboratory Training Office.
- See Concern TSA-4, QV.1-7, and TSA-4, QV.1-9.

CONCERN: At the Los Alamos National Laboratory, radiation protection
(TSA-4) technician training does not meet the requirements of DOE
(TC.9-1) 5480.11.
(H1/C1)

CONCERN: At Los Alamos National Laboratory, Tritium facilities and Los
(TSA-2) Alamos Critical Experiments Facility managers, supervisors,
(TC.10-1) and technical staff personnel do not receive the training
(H3/C1) necessary to broaden their overall knowledge and develop
management proficiency as required by DOE 5480.20.

CONCERN:At the Los Alamos National Laboratory, some programs for
(TSA-3) initial and continuing training for supervisors, managers,
(TC.10-1) and technical staff at accelerator facilities have not been
(H3/C2) established.

CONCERN:Los Alamos National Laboratory does not ensure that its
(TSA-4) managers and supervisors receive the training necessary to
(TC.10-1) fulfill safety and health responsibilities.
(H2/C2)

CONCERN:At the Los Alamos National Laboratory, exercises to develop and
(TSA-1) maintain skills in responding to process and procedure abnormal and
(TC.11-1) emergency events are not conducted at TA-55.
(H2/C2)

CONCERN:Tritium and reactor operators are not periodically evaluated
(TSA-2) at Los Alamos National Laboratory to ensure proper operating
(TC.11-1) team response to abnormal and emergency alarms as required by
(H2/C1) DOE 5480.20.

CONCERN:At the Los Alamos National Laboratory, no formal training
(TSA-3) programs exist within the accelerator divisions and
(TS.1-2) facilities that meet technical support training program
(H2/C2) guidelines described in DOE 5480.20.

CONCERN:Los Alamos National Laboratory is not in complete compliance
(TSA-1) with the requirements of 29 CFR 1910.134, Respiratory
(WS.3-1) Protection, for equipment storage, maintenance,
(H1/C1) tracking/accountability, inspection, and comprehensiveness of
CAT. II the respiratory protection program.

FINDINGS:

- Individuals who are required to act as first responders to chemical spills are not trained. For example, some security personnel assigned to TA-55 respond to chemical spill emergencies but have not received the required training.
- See Concerns TSA-1, EP.3-1, and TSA-1, TC.4-1.

NOTEWORTHY PRACTICES

TC.7 TRAINING FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: The training facilities, equipment, and materials should effectively support training activities.

NOTEWORTHY PRACTICE: A comprehensive glovebox training laboratory was included in the initial design and construction of the TA-55 Training Center. This training laboratory simulates typical conditions and capabilities found in a typical laboratory within Bldg. PF-4. There is a change room associated with the training laboratory, and access to the laboratory is gained through an airlock, and a set of double swinging doors. The inside of the training laboratory is authentically finished and equipped, and it appears that it would be difficult for a trainee to imagine he or she is not actually within the operating facility from the moment of entering the change room. This duplication extends even as far as the color schemes, operational eyewash stations and safety showers, hand and foot monitors, ceiling height, door size, corridor width, etc.

The training laboratory and installed gloveboxes are equipped with wet vacuum, dry vacuum, compressed air, chilled water, industrial water, and domestic water. Also included in the design is glovebox negative pressure of one-half -inch water, accurately mimicking Zone 1 pressure conditions within Bldg. PF-4 gloveboxes. There are three parallel lines of gloveboxes in the training laboratory. Two overhead transfer trolleys are included, situated at 90-degree angles to one another, with drop boxes at appropriate locations, so transfers can be made between the trolleys and between glovebox lines. Capability exists to install an inert-atmosphere glovebox, although this has not yet been accomplished.

Training which is routinely conducted in the training laboratory includes general glovebox operational safety (e.g., working with sharp objects, working with power tools, handling wet glassware, etc.), bag-out operations, trolley operations, glove change-out, window change-out for the various types of windows in use at TA-55, HEPA filter changeout. The five Bldg. PF-4 safety system alarms are all duplicated in the training laboratory and are used during routine training operations. These include ventilation failure, emergency evacuation, continuous air monitor, and the two fire alarms.

APPENDIX B

ORPS nature of occurrence, facility, and activity distributions, and subject report for LANL occurrence reports where training deficiencies were cited as either a direct or root cause.

NATURE OF OCCURRENCE DISTRIBUTION**Root Cause Cited as a Training Discrepancy**

11/11/96		Occurrence/Report Distribution by Nature of Occur. Sorted by Nature of Occurrence Code	
=====			
Code	Description	Occur. Count	Report Count

1.	Facility Condition		
1D.	Loss of Control of Radioactive Material/Spread Contamin	3	3
1F.	Violation/Inadequate Procedures	3	3
1H.	Operations	2	2
	TOTAL	8	8
2.	Environmental		
2B.	Hazardous Substances/Regulated Pollutants/Oil Releases	1	1
2E.	Agreement/Compliance Activities	1	1
	TOTAL	2	2
3.	Personnel Safety		
3A.	Occupational Illness/Injuries	1	1
	TOTAL	1	1
4.	Personnel Radiation Protection		
4B.	Personnel Contamination	3	3
	TOTAL	3	3
6.	Transportation	4	4
	TOTAL	4	4
10.	Cross-Category Items		
10C.	Potential Concerns/Issues	1	1
	TOTAL	1	1
	GRAND TOTAL	19	19

Direct Cause Cited as a Training Discrepancy

11/11/96		Occurrence/Report Distribution by Nature of Occur.	
		Sorted by Nature of Occurrence Code	
=====			
Code	Description	Occur. Count	Report Count

1.	Facility Condition		
1D.	Loss of Control of Radioactive Material/Spread Contamin	1	1
1G.	Unsatisfactory Surveillance/Inspections	1	1
	TOTAL	2	2
2.	Environmental		
2A.	Radionuclide Releases	1	1
2E.	Agreement/Compliance Activities	2	2
	TOTAL	3	3
4.	Personnel Radiation Protection		
4B.	Personnel Contamination	1	1
	TOTAL	1	1
6.	Transportation	4	4
	TOTAL	4	4
	GRAND TOTAL	10	10

FACILITY DISTRIBUTION**Root Cause Cited as a Training Discrepancy**

11/11/96 Occurrence/Report Distribution by Facility
 Sorted by Facility Acronym Code

=====

Facility Name	Acronym	Occur. Count	Report Count
Accelerator Complex	ACCCOMPLEX	3	3
ADO Administration	ADOADMIN	1	1
Chemistry & Metallurgy Research	CMR	4	4
Health Research Laboratory	HRL	2	2
Materials Science Complex	MATSCCMPLX	1	1
MEE Facilities	MEEFAC	1	1
Physics Complex	PHYSCOMPLX	1	1
Services Support Subcontractor	SERVICISS	2	2
SIGMA Complex	SIGMA	2	2
Plutonium Proc & Handling Fac	TA55	3	3
Waste Management	WASTEMGT	1	1
GRAND TOTAL		21	21

Direct Cause Cited as a Training Discrepancy

11/11/96 Occurrence/Report Distribution by Facility
 Sorted by Facility Acronym Code

=====

Facility Name	Acronym	Occur. Count	Report Count
LANL Fire Protection	FIREDEPT	1	1
Los Alamos National Laboratory	LANL	1	1
Laser Fusion Laboratory	LASFUSLAB	1	1
Physics Complex	PHYSCOMPLX	3	3
Radiochemistry Site	RADIOCHEM	1	1
SIGMA Complex	SIGMA	1	1
Waste Management	WASTEMGT	1	1
GRAND TOTAL		9	9

Root Cause Cited as a Training Discrepancy

Code	Description	Occur. Count	Report Count
01	Construction	1	1
02	Maintenance	3	3
03	Normal Operations	8	8
08	Transportation	3	3
10	Inspection/Monitoring	3	3
GRAND TOTAL		18	18

Code	Description	Occur. Count	Report Count
03	Normal Operations	1	1
06	Facility/System/Equipment Testing	1	1
08	Transportation	4	4
10	Inspection/Monitoring	3	3
GRAND TOTAL		9	9

CORRECTIVE ACTIONS**Root Cause Cited as a Training Discrepancy**

11/12/1996

=====

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-ACCCOMPLEX-1990-0132

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) No. 1

Responsible Group/Division: Engineering Field Operations

Direct Engineering Field Operations (ENG-5) area
 coordinator to inform craft workers to inform building
 managers before performing any work in building.

TARGET COMPLETION DATE: 02/15/1992 *COMPLETION DATE: 03/15/1992

02) No. 2

Responsible Group/Division: JCI

Johnson Controls Incorporated will establish procedures and
 a training program to ensure craftsman are aware of the
 requirements to review and comply with the Material Safety
 Data Sheet.

TARGET COMPLETION DATE: 02/15/1992 *COMPLETION DATE: 03/15/1992

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-ACCCOMPLEX-1991-0046

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) When working on the radioactive water systems, suit workers
 in multiple layers of protective clothing; tape sleeves into
 place. Outer layer to be waterproof.

TARGET COMPLETION DATE: 03/19/1991 COMPLETION DATE: 03/19/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-ACCCOMPLEX-1991-0050

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Improve training of those involved in working with
 contaminated water systems, emphasizing need for complete
 monitoring of material removed.

TARGET COMPLETION DATE: 03/22/1991 COMPLETION DATE: 03/22/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-ADOADMIN-1993-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Counsel Employee

The employee who fell was counselled concerning the
 importance of observing safe office practices.

Responsible Group/Division: FIN-DO

TARGET COMPLETION DATE: 04/23/1993 COMPLETION DATE: 04/23/1993

02) Conduct Safety Meetings and Show Office Safety Film

Safety Meetings will be held for all FIN Division Groups.
 Office Safety will be discussed and a film on office safety
 will be shown.

Responsible Group/Division: FIN-DO

TARGET COMPLETION DATE: 06/30/1993 *COMPLETION DATE: 08/11/1993

03) Laboratory News Bulletin Article

An article will be carried in The Laboratory News Bulletin providing information on a recent occurrence involving an office accident in which an employee was injured due to the use of a swivel chair in place of the appropriate step stool or ladder. The article will present the need to perform task in a safe manner.

Responsible Group/Division: HS-5, LAO-1
TARGET COMPLETION DATE: 06/30/1993 *COMPLETION DATE: 08/11/1993

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-CMR-1990-0159

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) NMT Division has implemented the following on 01/17/91: 1) A goal was established for reducing this type of incident and communicated through safety programs. 2) A review will be made of training programs with the aim of enhancing glove related issues. 3) A task force will examine glove related policy/practices and evaluate newer glove technologies.
TARGET COMPLETION DATE: 01/17/1991 COMPLETION DATE: 01/17/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-CMR-1992-0009

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) No. 1

Group Leader of the Physical Chemistry Group (CLS-2) informed CLS-2 employees that, in the future, similar problems of work not being completed in a timely manner should be brought to his attention before any action is taken.

TARGET COMPLETION DATE: 03/04/1992 COMPLETION DATE: 03/04/1992

02) No. 2

A copy of the lockout/tagout procedure was given to CLS-2 employees.

TARGET COMPLETION DATE: 03/06/1992 COMPLETION DATE: 03/06/1992

03) No. 3

Responsible Group/Division: CLS-2

Train CLS-2 personnel in lockout/tagout procedure.

TARGET COMPLETION DATE: 04/30/1992 *COMPLETION DATE: 12/17/1992

04) No. 4

Responsible Group/Division: MST-DO

A memo was written to the Associate Director of Quality, Policy, and Performance to request a review of the work order process to determine if delays could be minimized. A response memo to the Facility Manager was generated by the Associate Director of Operations on March 23, 1992 stating that the Continuous Quality Improvement team is currently attempting to reduce the work order processing time by 50%.

TARGET COMPLETION DATE: 05/08/1992 COMPLETION DATE: 03/18/1992

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-CMR-1993-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Wing 9 Decontamination
Schedule and coordinate deconners to remove fixed contamination identified in Wing 9.

- Responsible Group/Division: MST-5
 TARGET COMPLETION DATE: 12/23/1993 *COMPLETION DATE: 08/06/1993
- 02) CMR Radiological Control Procedure Revision
 The CMR Radiological Control Procedure will be revised to include guidelines for use of vacuum cleaners in the CMR facility. The procedure will prohibit the use of non-HEPA filtered vacuum cleaners in radiologically controlled areas.
 Responsible Group/Division: CLS-DO
 TARGET COMPLETION DATE: 06/30/1993 COMPLETION DATE: 06/30/1993
- 03) Implementation of RCT Training Program
 A formal RCT Training Program is being developed per the DOE Radiological Control Manual Chapter 6, Part 4. Full implementation is expected by June 1994. Classes, as they are identified, are currently being implemented.
 Responsible Group/Division: HS-1
 TARGET COMPLETION DATE: 06/30/1994 *COMPLETION DATE: 10/31/1994
- 04) Assignment of an RCT
 HS-1 assigned a more experienced RCT full-time to Wing 9. The RCT has more understanding of hot particle contamination and is better able to cope with the activity problems being identified. The full-time RCT will also provide increased surveying for particle contamination.
 Responsible Group/Division: HS-1
 TARGET COMPLETION DATE: 01/29/1993 COMPLETION DATE: 01/29/1993
- 05) Posting of Hot Particle Area
 Because the areas identified with the hot particle contamination could not be decontaminated within a reasonable length of time, the areas in question were posted as contaminated areas-hot particles. Radiation Work Permits (RWPs) are required for access.
 Responsible Group/Division: HS-1
 TARGET COMPLETION DATE: 01/29/1993 COMPLETION DATE: 01/29/1993
- 06) Monitoring of Protective Clothing
 A whole-body portal monitor is in operation outside of the posted contaminated area. Personnel are required to exit through the portal monitor to check for hot particles on the protective clothing (anti-c). Additionally, disposable paper clothing is worn on the outside of the anti-c clothing and disposed of as the employees exits the posted contaminated area.
 Responsible Group/Division: HS-1

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-CMR-1993-0028

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Counsel the employee.
 Counsel the employee on the proper methods for donning and doffing anti-contamination clothing in order to prevent reoccurrence.
 Responsible Group/Division: JCI
 TARGET COMPLETION DATE: 12/06/1993 COMPLETION DATE: 12/06/1993
- 02) Establish a refresher training program.
 Establish a program for the provision of refresher training for individuals that are not frequently involved in radiologically controlled work.
 Responsible Group/Division: JCI
 TARGET COMPLETION DATE: 12/06/1993 COMPLETION DATE: 12/06/1993

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-HRL-1991-1001

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) No. 1
 Responsible Group/Division: Maintenance Group (ENG-6)

The steam crew of Johnson Controls, Inc., was sent in to assess, troubleshoot, and repair the steam system.
TARGET COMPLETION DATE: 12/13/1991 *COMPLETION DATE: 11/19/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-HRL-1995-0003

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Access Revoked

Immediately after evaluation of information regarding this occurrence, the researcher's badge reader access to the radiological controlled area was removed.

Responsible Group/Division: LS-2(Genomics & Structural Biology)

TARGET COMPLETION DATE: 03/03/1995 COMPLETION DATE: 03/03/1995

02) Review Meeting

A mandatory follow-up meeting of all radiological controlled area workers was held to reemphasize the importance of following procedures.

Responsible Group/Division: LS-DO (Life Sciences Division)

TARGET COMPLETION DATE: 03/10/1995 COMPLETION DATE: 03/10/1995

03) Written Letter of Counseling

The researcher was given a written letter of counseling which excluded the researcher from accessing any experimental area within Building HRL-1 for a period of three months.

Responsible Group/Division: LS-DO (Life Sciences Division)

TARGET COMPLETION DATE: 03/13/1995 COMPLETION DATE: 03/13/1995

04) Retraining of Researcher

After the three month exclusion period, the researcher will be required to retake Radiological Worker II training, TA-43, HRL Facility Specific Training, and must review all applicable SOPs (standard operating procedures) for working with radioactive materials before the researcher is given access to the experimental areas at this site.

Responsible Group/Division: LS-DO (Life Sciences Division)

TARGET COMPLETION DATE: 06/19/1995 COMPLETION DATE: 06/19/1995

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-MATSCCMPLX-1990-0134

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) DISCUSSED OCCURRENCE WITH CUSTODIAL SUPERVISOR AND CUSTODIAN RESPONSIBLE FOR TRASH REMOVAL. ALSO NEW LABELS; "DO NOT EMPTY OR REMOVE" WERE PUT ON HAZARDOUS WASTE CONTAINERS. ALSO, ALL RED NON-HAZARDOUS WASTE CONTAINERS WERE REMOVED FROM OUR LABS. THESE ACTIONS SHOULD RESULT IN BETTER CUSTODIAL TRAINING AND BETTER IMPLEMENTATION OF OUR HAZARDOUS WASTE PROGRAM.

TARGET COMPLETION DATE: 12/17/1990 COMPLETION DATE: 12/17/1990

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-MEEFAC-1993-0001

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) A memorandum describing the violations of policies and procedures that pertain to this occurrence along with the procedures that should have been followed, will be written by

the MEE-13 Group Leader and distributed to all staff working for MEE Division.

Responsible Group/Division: Advanced Engineering Technology Group (MEE-13).

TARGET COMPLETION DATE: 10/29/1993 *COMPLETION DATE: 10/29/1993

- 02) The MEE-13 Group Leader will schedule a training session that covers the proper procedures for transportation of hazardous materials to be attended by MEE-13 and Sensor Systems And Robotics (MEE-3).

Responsible Group/Division: Advanced Engineering Technology Group (MEE-13).

TARGET COMPLETION DATE: 10/29/1993 *COMPLETION DATE: 03/24/1994

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-PHYSCOMPLX-1993-0004

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Preparation of Health Physics Procedures
The Health Physics Operations Group, HS-1, has developed interim procedures for 1) Equipment Release, 2) Health Physics Radioactive Materials Survey and Health Physics Release Tags, 3) Alpha Contamination Surveys, and 4) Surveying for Beta/Gamma Contamination. The equipment release procedure requires monitoring the exterior and interior for contamination before releasing equipment including both direct and smear surveys. The procedures will be part of the core training program for Radiological Control Technicians.
Responsible Group/Division: HS-1
TARGET COMPLETION DATE: 09/30/1993 COMPLETION DATE: 09/14/1993
- 02) Implementation of RCT Training Program
A formal Radiological Control Technician (RCT) Training Program is being developed per the DOE Radiological Control Manual Chapter 6, Part 4. Full implementation is expected by June, 1994. Classes, as they are identified, are currently being implemented including training on procedures as they are developed.
Responsible Group/Division: HS-1
TARGET COMPLETION DATE: 06/30/1994 *COMPLETION DATE: 10/31/1994

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-SERVICISS-1991-1010

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) No. 1
Altitude valve was repaired.
TARGET COMPLETION DATE: 12/09/1991 COMPLETION DATE: 12/09/1991
- 02) No. 2
Responsible Group/Division: JCI
Install new altitude valve.
*TARGET COMPLETION DATE: 10/31/1992 *COMPLETION DATE: 02/01/1992
- 03) No. 3
Responsible Group/Division: JCI
Revise and issue the Confined Space Procedure for Johnson Controls, Inc.
*TARGET COMPLETION DATE: 10/31/1992 *COMPLETION DATE: 03/01/1992
- 04) No. 4
Responsible Group/Division: JCI
Evaluate and complete Confined Space Training Program for all required JCI personnel.
*TARGET COMPLETION DATE: 02/15/1993 *COMPLETION DATE: 06/01/1992

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-SERVICISS-1991-1553

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) No. 1

Public Service of New Mexico (PNM) and vendor will identify and correct all factory miswiring in newly installed switchgear.

TARGET COMPLETION DATE: 07/26/1991 COMPLETION DATE: 07/26/1991

02) No. 2

Responsible Group/Division: Johnson Controls, Inc.

Ongoing training program procedure will be formalized and implemented.

*TARGET COMPLETION DATE: 03/01/1992 *COMPLETION DATE: 03/16/1992

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-SIGMA-1994-0003

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) MST-6 was notified of discrepancy.

Responsible Group: Property Management & Packaging & Transportation Group (BUS-6)

TARGET COMPLETION DATE: 01/21/1994 COMPLETION DATE: 01/21/1994

02) MST-6 hosted a meeting with BUS-6 to discuss the communication problem and misunderstanding. Both parties clearly understand each others roles and responsibilities.

Responsible Group: Sigma Complex (MST-6)

TARGET COMPLETION DATE: 02/17/1994 COMPLETION DATE: 02/17/1994

03) MST-6 personnel were trained in the shipping of Radioactive Material and are certified as Radioactive Material shippers.

Responsible Group: Sigma Complex (MST-6)

TARGET COMPLETION DATE: 03/14/1994 COMPLETION DATE: 03/14/1994

04) BUS-6 updated the course material to better define what is and what is not part of a single package.

Responsible Group: Bus-6

TARGET COMPLETION DATE: 04/27/1994 COMPLETION DATE: 04/27/1994

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-SIGMA-1996-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Notify All Approving Officials

All approving officials were notified via e-mail of the potential violations involved when making any intra-laboratory shipments. If any material is suspect, MST-6 personnel will contact BUS-4 to determine if the material is under DOT regulation. If BUS-4 personnel determine that the material is under DOT regulation, MST-6 will contract BUS-4 personnel to package and transport the material in accordance with DOT regulations.

Responsible Group/Division: MST-EHSF

TARGET COMPLETION DATE: 08/06/1996 COMPLETION DATE: 08/06/1996

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-TA55-1991-1030

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Provide all JCI Craft workers assigned to TA-55 with the full 16 hour RWT01 training.

Responsible Organization: JCI/JQAP
TARGET COMPLETION DATE: 09/10/1991 COMPLETION DATE: 09/10/1991
02) Establish a formal NMT/HS-1/JCI coordination effort to effectively disseminate contamination and radiation monitoring/survey policy and procedures.

Responsible Organization: NMT-DO Safety Officer
TARGET COMPLETION DATE: 09/30/1991 COMPLETION DATE: 08/16/1991
03) Provide TA-55 site-wide safety meeting to clarify the use of protective clothing, cross-contamination and safety requirements for working in the TA-55 plutonium processing area. All NMT, JCI, HS-1, ENG, etc. workers were required to attend this meeting.

Responsible Organization: NMT-DO Safety Officer
TARGET COMPLETION DATE: 09/06/1991 COMPLETION DATE: 09/06/1991
04) Determine if the current progress in the TA-55 preventative maintenance and configuration control management programs is adequate to minimize re-occurrence of similar incidents.

Responsible Organization: NMT-8
TARGET COMPLETION DATE: 09/30/1991 COMPLETION DATE: 09/30/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-TA55-1991-1038

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Tape the sharp edges on the control racks.
TARGET COMPLETION DATE: 11/26/1991 COMPLETION DATE: 12/04/1991
02) Design and install a cover for the control racks that do not have sharp edges.
Responsible Group/Division: NMT-3
TARGET COMPLETION DATE: 01/15/1992 COMPLETION DATE: 01/15/1992
03) Ensure that all personnel receive the appropriate initial and refresher training to include the use of proper protective clothing and emphasize following of established procedures.
Responsible Group/Division: NMT-3
TARGET COMPLETION DATE: 01/14/1992 COMPLETION DATE: 01/14/1992

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-TA55-1991-1039

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) Nuclear Materials Management (NMT-7) will continue to review paperwork and drums upon receipt to discover mis-labeled drums.
TARGET COMPLETION DATE: 12/15/1991 COMPLETION DATE: 12/15/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-WASTEMGT-1991-1532

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

01) See Item 18. An updated procedure will be written and necessary training given to the appropriate personnel.
TARGET COMPLETION DATE: 07/15/1991 COMPLETION DATE: 08/15/1991

Direct Cause Cited as a Training Discrepancy

11/12/1996

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OCCURRENCE REPORT NUMBER: ALO-LA-GOLA-FIREDEPT-1992-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) All LAFD personnel assigned CFR duties will receive a refresher on procedures that cover the use of CFR-60.
TARGET COMPLETION DATE: 02/05/1993 COMPLETION DATE: 02/05/1993
- 02) This unit was again given the DOE/COR designed flow test.
The unit passed the test.
TARGET COMPLETION DATE: 02/05/1993 COMPLETION DATE: 02/05/1993

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-LANL-1994-0018

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Provide BUS-4 with technical information regarding the correct processing of Limited Quantity shipping papers.

Responsible Group/Division: BUS-6
TARGET COMPLETION DATE: 01/30/1995 COMPLETION DATE: 01/30/1995
- 02) Institute BUS-6 review of BUS-4 shipping papers.

Responsible Group/Division: BUS-6
TARGET COMPLETION DATE: 01/30/1995 COMPLETION DATE: 01/30/1995
- 03) Institute policy to use only LANL and JCI to transport hazardous waste between technical areas, and provide carrier with a uniform hazardous waste manifest.

Responsible Group/Division: BUS-6
TARGET COMPLETION DATE: 01/30/1995 COMPLETION DATE: 01/30/1995

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-LASFUSLAB-1991-1520

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) No. 1
Involve a certified Hazardous Waste Coordinator at this site.
TARGET COMPLETION DATE: 06/30/1991 COMPLETION DATE: 06/30/1991
- 02) No. 2
Management will establish policy that will ensure that hazardous waste managers are fully trained prior to being assigned hazardous waste responsibilities.
TARGET COMPLETION DATE: 06/30/1991 COMPLETION DATE: 06/30/1991
- 03) No. 3
Management will institute an ongoing hazardous waste handling/disposal training program.
TARGET COMPLETION DATE: 08/15/1991 COMPLETION DATE: 08/15/1991

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-PHYSCOMPLX-1993-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Inform Manufacturer of Deficiencies.
P-6 Biochemistry Section sent a letter to the manufacturer of the HPLC notifying them that the operator's manual and onsite training failed to instruct users on the need to use the injector port coupler for full purging of the instrument.

Responsible Group/Division: P-6
TARGET COMPLETION DATE: 10/18/1994 COMPLETION DATE: 10/18/1994

02) Revise SOP for Handling Rads.

The "Safe Operating Procedures for Use and Disposal of Radioactive Chemicals" was revised to include specific instructions for ordering, receiving, handling, disposing of and monitoring for radiochemicals used by the Biochemistry Section.

The procedures for using radiolabeled nucleotides in the HPLC calls for the RCT to establish a radiological buffer area prior to the operation. Following use, the sample injection port is to be cleaned "using the Needle Port Cleaner according to Section 6.1 of the manufacturer's procedure." The HPLC is purged until no radioactivity can be detected in the effluent. After the instrument and the area are appropriately monitored, the RCT removes the buffer area designation.

The section on waste disposal states that "non-radioactive non-controlled garbage is collected only in room 147B where only nonradioactive experiments are performed. This trash will be appropriately monitored for radioactivity by the ESH-1 RCT or a trained lab member [laboratory member with training equivalent to an RCT] before being disposed."

The section on contamination monitoring includes the requirement that "everyone exiting the radiological control area checks their hands and feet for contamination using the survey instrument at the door."

The revised SOP was signed by the P-6 Group Leader on 07/01/93 and was implemented immediately. Division level approval is expected by 01/30/95.

Responsible Group/Division: P-6

TARGET COMPLETION DATE: 01/30/1995 *COMPLETION DATE: 04/18/1995

03) Radiation Worker Training.

Both P-6 employees who use the HPLC received the Laboratory's Radiation Worker II training. The employee with primary responsibility for the HPLC completed training on 06/10/93. The second employee completed training on 10/28/94.

Responsible Group/Division: P-6

TARGET COMPLETION DATE: 10/28/1994 COMPLETION DATE: 10/28/1994

04) Moratorium on Waste Segregation from Controlled Areas. LANL issued a moratorium on the segregation of wastes from areas controlled for radioactive contamination. The moratorium was to remain in effect until ESH-1 and Waste Management (CST-7) could jointly review and approve facility-specific waste handling procedures.

Responsible Group/Division: ESH-1

TARGET COMPLETION DATE: 06/18/1993 COMPLETION DATE: 06/18/1993

05) Monitor Waste.

At the request of P-6 and as stipulated by the revised SOP dated 7/1/93, ESH-1 monitors all nonradioactive waste prior to removal from the P-6 laboratory.

Responsible Group/Division: ESH-1

TARGET COMPLETION DATE: 07/10/1993 COMPLETION DATE: 07/10/1993

06) Establish RMMAs.

The P-6 Biochemistry Section established Radioactive Materials Management Areas incorporating guidance from Environmental Protection (ESH-8) and the Division ES&H Officer. The RMMAs determine waste handling methods for the area.

Responsible Group/Division: P-6

TARGET COMPLETION DATE: 07/10/1993 COMPLETION DATE: 07/10/1993

07) ESH-1/P-6 Communication.

The Biochemistry Section discussed their SOP and their laboratory operations with the ESH-1 RCT supervisor.

Responsible Group/Division: P-6
TARGET COMPLETION DATE: 09/20/1994 COMPLETION DATE: 09/20/1994
08) Definition of Roles and Responsibilities for Waste Handling.

Two P-6 Biochemistry Section employees onsite at Building 16 were trained, one as Waste Coordinator and one as Spill Coordinator.

Responsible Group/Division: P-6
TARGET COMPLETION DATE: 07/01/1993 COMPLETION DATE: 06/23/1993

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-PHYSCOMPLX-1993-0003
CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Inform Manufacturer of Deficiencies.
P-6 Biochemistry Section sent a letter the manufacturer of the HPLC notifying them that the operator's manual and onsite training failed to instruct users on the need to use the injector port coupler for full purging of the instrument.

Responsible Group/Division: P-6
TARGET COMPLETION DATE: 10/18/1994 COMPLETION DATE: 10/18/1994
02) Revise SOP for Handling Radioactive Chemicals.

The Safe Operating Procedures for Use and Disposal of Radioactive Chemicals was revised. The procedure for using radiolabeled nucleotides in the HPLC calls for the RCT to establish a radiological buffer area prior to the operation. Following use, the sample injection port is to be cleaned "using the Needle Port Cleaner according to Section 6.1 of the manufacturer's procedure." The HPLC is purged until no radioactivity can be detected in the effluent. After the instrument and the area are appropriately monitored, the RCT removes the buffer area designation.

The SOP includes additional monitoring requirements, which include checking work areas and non-disposable items used in radiological work. The RCT or a laboratory employee with equivalent training will check the non-radioactive, non-controlled garbage before disposal by the custodian. All non-personal equipment must be monitored by the RCT before it is moved from the controlled area. Personnel leaving the controlled area are required to monitor their hands and feet and any personal items such as notebooks or tools.

The revised SOP was signed by the P-6 Group Leader on 07/01/93 and was implemented immediately. Division-level approval is expected by 01/30/95.

- Responsible Group/Division: P-6
TARGET COMPLETION DATE: 01/30/1995 *COMPLETION DATE: 04/18/1995
03) Radiation Worker Training.
Both P-6 employees who use the HPLC attended the Laboratory's Radiation Worker 2 training. The employee whose shoe had been contaminated completed training on 06/10/93. The second employee completed training on 10/28/94.

- Responsible Group/Division: P-6
TARGET COMPLETION DATE: 10/28/1994 COMPLETION DATE: 10/28/1994
04) ESH-1/P-6 Communication.
The Biochemistry Section discussed their SOP and their laboratory operations with the ESH-1 RCT supervisor.

Responsible Group/Division: P-6
TARGET COMPLETION DATE: 09/20/1994 COMPLETION DATE: 09/20/1994

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-PHYSCOMPLX-1994-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Remind drivers to check every package.
The BUS-4 supervisor reminded all the drivers to be vigilant in cross-checking shipping papers with package markings and to be sure to check each package individually.
- Responsible Group/Division: BUS-4
TARGET COMPLETION DATE: 02/18/1994 COMPLETION DATE: 02/18/1994
- 02) The Facility Manager advised the P-15 group leader to ensure that qualified personnel are assigned to arrange the shipment of hazardous material.
- Responsible Group/Division: P-15
TARGET COMPLETION DATE: 02/28/1994 COMPLETION DATE: 02/28/1994

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-RADIOCHEM-1994-0009

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

Revise CST-AP-04, "Waste Management and Minimization Plan," to require DOT-certified packagers to oversee packaging of waste for special jobs in which the waste may exceed 200 millirem/hour on contact. The procedure will also require that all personnel work together to ensure the shipment does not exceed the DOT limit of 200 mR/hour at the surface.

Responsible Group/Division: CST-25
TARGET COMPLETION DATE: 05/10/1996 COMPLETION DATE: 04/25/1996

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-SIGMA-1996-0002

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Notify All Approving Officials
- All approving officials were notified via e-mail of the potential violations involved when making any intra-laboratory shipments. If any material is suspect, MST-6 personnel will contact BUS-4 to determine if the material is under DOT regulation. If BUS-4 personnel determine that the material is under DOT regulation, MST-6 will contract BUS-4 personnel to package and transport the material in accordance with DOT regulations.
- Responsible Group/Division: MST-EHSF
TARGET COMPLETION DATE: 08/06/1996 COMPLETION DATE: 08/06/1996

OCCURRENCE REPORT NUMBER: ALO-LA-LANL-WASTEMGT-1993-0003

CORRECTIVE ACTIONS:

(* = Date added/revised since final report was signed off)

- 01) Title: Write new procedure
- Rewrite procedure.
- Responsible Group/Division: Waste Management (EM-7)
TARGET COMPLETION DATE: 02/12/1993 COMPLETION DATE: 02/13/1993
- 02) Title: Personnel assignment
- Assign back-up person

Responsible Group/Division: Waste Management (EM-7)
TARGET COMPLETION DATE: 02/12/1993 COMPLETION DATE: 02/13/1993
03) Title: New mail stop

Obtain new mail stop for manifest receipt.

Responsible Group/Division: Waste Management (EM-7)
TARGET COMPLETION DATE: 02/12/1993 COMPLETION DATE: 02/13/1993
04) Title: Training

Training on new procedure.

Responsible Group/Division: Waste Management (EM-7)
TARGET COMPLETION DATE: 02/12/1993 COMPLETION DATE: 02/13/1993

SUBJECT REPORT**Root Cause Cited as a Training Discrepancy**

11/11/96 Occurrence Subject/Title Report
Sorted by Occurrence Report Number

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Occurrence Report Number/ Facility Name	Occurrence Category	Report Type/ # of Occur.	Discovery Date	Report Date
ALO-LA-LANL-ACCCOMPLEX-1990-0132 Accelerator Complex TITLE: Paint Fumes in Air Handling System	Off-Normal	Final 1	09/28/90	02/18/92
ALO-LA-LANL-ACCCOMPLEX-1991-0046 Accelerator Complex TITLE: Radioactive contamination of worker and personnel clothing	Off-Normal	Final 1	03/12/91	04/16/91
ALO-LA-LANL-ACCCOMPLEX-1991-0050 Accelerator Complex TITLE: Discovery of radioactive material outside a controlled area.	Off-Normal	Final 1	03/14/91	02/18/92
ALO-LA-LANL-ADOADMIN-1993-0002 ADO Administration TITLE: Employee kneeling on a chair fell from the chair and against a pipe after losing her balance	Off-Normal	Final 1	04/19/93	05/10/93
ALO-LA-LANL-CMR-1990-0159 Chemistry & Metallurgy Research TITLE: Low level exposure glovebox incident	Off-Normal	Final 1	11/20/90	04/17/91
ALO-LA-LANL-CMR-1992-0009 Chemistry & Metallurgy Research TITLE: Deviation from Written Procedures	Off-Normal	Final 1	02/28/92	04/01/92
ALO-LA-LANL-CMR-1993-0002 Chemistry & Metallurgy Research TITLE: Loss of control of radioactive material in excess of guidelines	Off-Normal	Final 1	01/28/93	01/04/94
ALO-LA-LANL-CMR-1993-0028 Chemistry & Metallurgy Research TITLE: Personnel skin contamination	Off-Normal	Final 1	08/18/93	02/09/95
ALO-LA-LANL-HRL-1991-1001 Health Research Laboratory TITLE: Broken Cooling Coil/Failure of Freeze Protection System.	Off-Normal	Final 1	10/31/91	01/02/92
ALO-LA-LANL-HRL-1995-0003 Health Research Laboratory TITLE: Improper Response to Personnel Contamination Monitor Alarm	Off-Normal	Final 1	03/02/95	09/06/95
ALO-LA-LANL-MATSCCMPLX-1990-0134 Materials Science Complex TITLE: DISPOSAL OF HAZARDOUS WASTE RAGS INTO NON-HAZARDOUS WASTE CONTAINER.	Off-Normal	Final 1	09/27/90	04/17/91
ALO-LA-LANL-MEEFAC-1993-0001 MEE Facilities TITLE: Non-Compliance with Department of Transportation (DOT) marking, labeling, and description regulations	Off-Normal	Final 1	10/04/93	12/01/93
ALO-LA-LANL-PHYSCOMPLX-1993-0004 Physics Complex TITLE: Improper Shipment of Contaminated Equipment.	Unusual	Final 1	07/02/93	12/22/93
ALO-LA-LANL-SERVICISS-1991-1010	Off-Normal	Final	12/07/91	02/19/92

Services Support Subcontractor		1		
TITLE: TA-59 Water Tank Overflowing				
ALO-LA-LANL-SERVICESS-1991-1553	Off-Normal	Final	07/23/91	10/24/91
Services Support Subcontractor		1		
TITLE: Unplanned electrical outage disrupting normal operations.				
ALO-LA-LANL-SIGMA-1994-0003	Off-Normal	Final	01/20/94	05/23/94
SIGMA Complex		1		
TITLE: NonCompliance of Radioactive Materials Transfer Form				
ALO-LA-LANL-SIGMA-1996-0002	Off-Normal	Update/(Fnl.)	06/03/96	08/07/96
SIGMA Complex		1		
TITLE: An intra-Laboratory shipment results in a Department of TransportationNoncompliance				
ALO-LA-LANL-TA55-1991-1030	Off-Normal	Final	08/15/91	10/16/92
Plutonium Proc & Handling Fac		1		
TITLE: Skin Contamination				
ALO-LA-LANL-TA55-1991-1038	Off-Normal	Final	11/18/91	10/16/92
Plutonium Proc & Handling Fac		1		
TITLE: Skin Contamination of Right Hand in PF-4, Room 429.				
ALO-LA-LANL-TA55-1991-1039	Off-Normal	Final	12/12/91	01/13/92
Plutonium Proc & Handling Fac		1		
TITLE: Transportation Manifest Discrepancy				
ALO-LA-LANL-WASTEMGT-1991-1532	Off-Normal	Final	06/07/91	10/21/91
Waste Management		1		
TITLE: Release of liquid at Solid Disposal Site.				

Direct Cause Cited as a Training Discrepancy

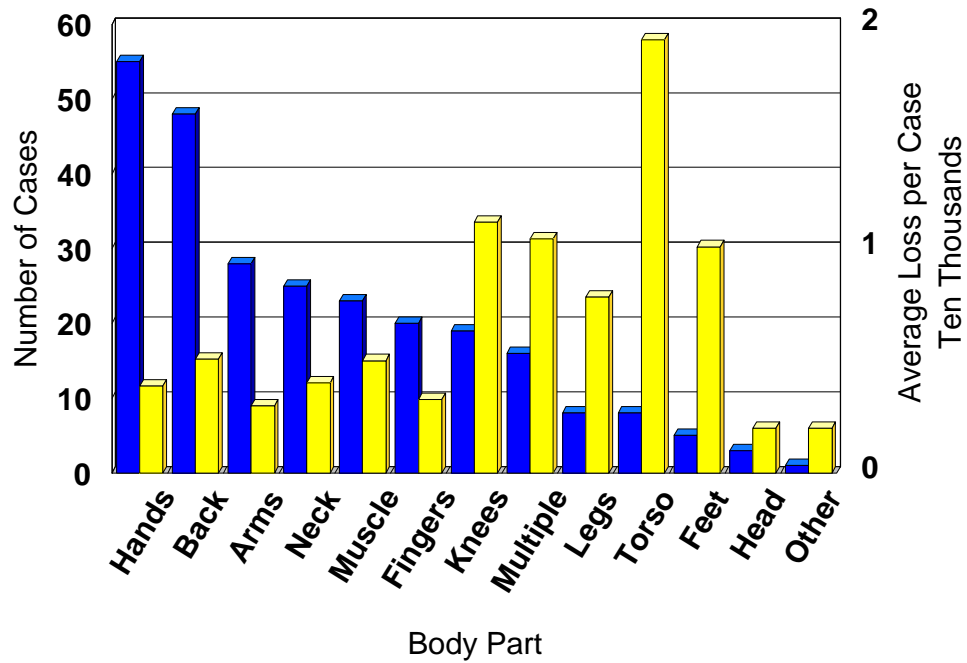
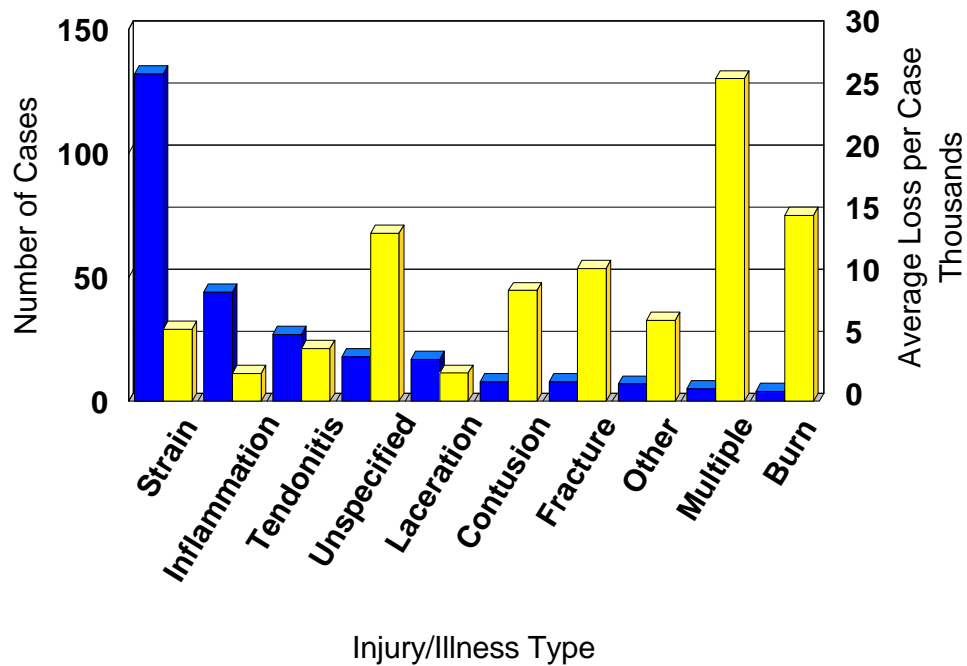
11/11/96 Occurrence Subject/Title Report
Sorted by Occurrence Report Number

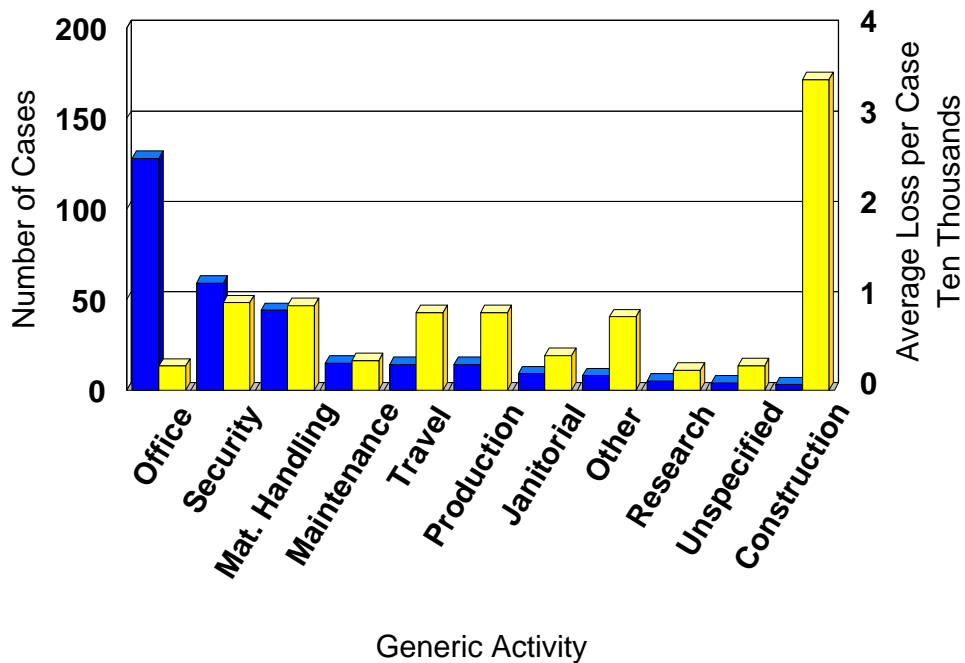
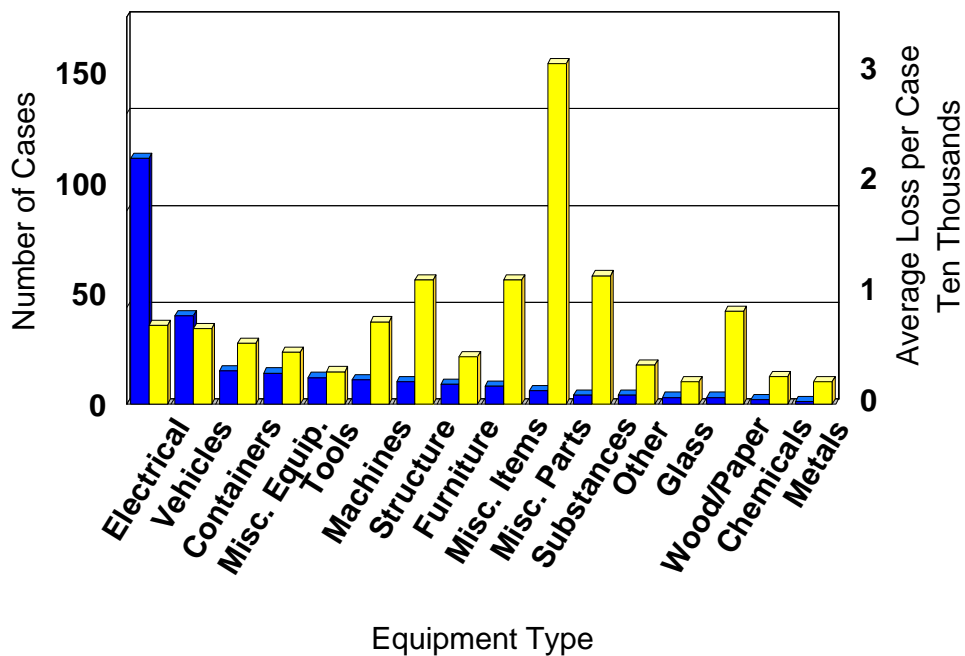
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Occurrence Report Number/ Facility Name	Occurrence Category	Report Type/ # of Occur.	Discovery Date	Report Date
ALO-LA-GOLA-FIREDEPT-1992-0002 LANL Fire Protection TITLE: Test of CFR-60 CFR Firefighting Capabilities	Off-Normal	Final 1	10/02/92	04/05/93
ALO-LA-LANL-LANL-1994-0018 Los Alamos National Laboratory TITLE: Department of Transportation Issues Notice of Claim to Los Alamos National Laboratory	Off-Normal	Final 1	12/14/94	10/10/95
ALO-LA-LANL-LASFUSLAB-1991-1520 Laser Fusion Laboratory TITLE: State Environment Department cited non-compliance violation for failure to meet requirements for Hazardous Waste Storage.	Unusual	Final 1	05/06/91	02/26/92
ALO-LA-LANL-PHYSCOMPLX-1993-0002 Physics Complex TITLE: Detection of radionuclide at landfill	Unusual	Final 1	05/28/93	02/10/95
ALO-LA-LANL-PHYSCOMPLX-1993-0003 Physics Complex TITLE: Contaminated personal shoe	Off-Normal	Final 1	06/02/93	02/28/95
ALO-LA-LANL-PHYSCOMPLX-1994-0002 Physics Complex TITLE: Intra-Laboratory Shipment of Beryllium Compound Without Hazardous Materials Transfer Form	Off-Normal	Final 1	02/08/94	11/23/94
ALO-LA-LANL-RADIOCHEM-1994-0009 Radiochemistry Site TITLE: Noncompliance with Department of Transportation Shipping Requirements That Resulted from Shifting of Radioactive Contents	Off-Normal	Final 1	10/05/94	05/30/96
ALO-LA-LANL-SIGMA-1996-0002 SIGMA Complex TITLE: An intra-Laboratory shipment results in a Department of Transportation Noncompliance	Off-Normal	Update/(Fnl.) 1	06/03/96	08/07/96
ALO-LA-LANL-WASTEMGT-1993-0003 Waste Management TITLE: Manifest exception report exceedance	Off-Normal	Final 1	02/11/93	05/18/93

APPENDIX C

CAIRS body part, injury type, activity type, occupation, and equipment distributions, and one-line narrative report for LANL 1990-96 accident reports where human error is cited as a direct or indirect cause and *training* is referred to in the narrative description. Note that the distributions do not reflect costs for terminations or transfers.

BODY PART DISTRIBUTIONINJURY TYPE DISTRIBUTION

ACTIVITY TYPE DISTRIBUTIONEQUIPMENT DISTRIBUTION

OCCUPATION DISTRIBUTION

Ranked Injury Costs by Occupation

Excluding Costs for Deaths, Terminations, & Transfers

Occupation	TRC	NFC	Death	LWC	WDL Only Cases	WDLR Only Cases	WDL	WDLR	LWD	Avg WDL	Avg WDLR	Max WDL	Max WDLR	Term/ Trans Cases	Injury Cost
SECURITY GUARD	47	12	0	35	22	4	421	264	685	9	6	116	81	0	620,600
ADMIN. SUPPORT/CLERICAL EMPLOYEE	88	79	0	9	1	8	5	223	228	0	3	5	120	1	270,200
TECHNICIAN (UNKNOWN)	14	11	0	3	1	1	83	104	187	6	7	80	100	0	152,600
HANDLER/LABORER/HELPER	7	1	0	6	1	3	46	44	90	7	6	28	14	0	77,600
MISCELLANEOUS TECHNICIAN	21	17	0	4	0	4	0	67	67	0	3	0	25	0	68,800
MASON	1	0	0	1	1	0	51	0	51	51	0	51	0	0	53,000
TRUCK DRIVER	5	0	0	5	3	2	22	37	59	4	7	11	27	0	46,800
CARPENTER	3	0	0	3	1	0	34	12	46	11	4	16	6	0	44,800
MACHINIST	6	3	0	3	0	1	16	31	47	3	5	14	28	0	40,400
JANITOR	7	1	0	6	1	4	8	40	48	1	6	7	17	0	38,000
ENGINEERING TECHNICIAN	8	6	0	2	0	1	5	41	46	1	5	5	39	0	37,400
OPERATOR, PLANT/SYSTEM/UTILITY	2	1	0	1	0	1	0	57	57	0	29	0	57	0	26,800
MISC. PROFESSIONAL	10	9	0	1	0	1	0	5	5	0	1	0	5	0	22,000
MECHANIC/REPAIRER	1	0	0	1	0	0	3	37	40	3	37	3	37	0	19,800
MANAGER/ADMINISTRATOR	8	6	0	2	0	2	0	9	9	0	1	0	5	0	19,600
SCIENTIST	8	6	0	2	1	1	2	2	4	0	0	2	2	0	18,800
HEALTH TECHNICIAN	1	0	0	1	0	0	1	35	36	1	35	1	35	0	17,000
ENGINEER	8	8	0	0	0	0	0	0	0	0	0	0	0	0	16,000
RADIATION MONITOR/TECHNICIAN	3	1	0	2	0	1	1	20	21	0	7	1	16	0	15,000
SCIENCE TECHNICIAN	7	6	0	1	1	0	1	0	1	0	0	1	0	0	15,000
MISC EMPLOYEE	4	3	0	1	1	0	1	0	1	0	0	1	0	0	9,000
ELECTRICIAN	3	1	0	2	2	0	2	0	2	1	0	1	0	0	8,000
PIPE FITTER	3	2	0	1	1	0	2	0	2	1	0	2	0	0	8,000
MACHINE SETUP/OPERATOR	1	0	0	1	0	1	0	5	5	0	5	0	5	0	4,000
PAINTER	1	0	0	1	0	1	0	2	2	0	2	0	2	0	2,800
EQUIPMENT OPERATOR	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2,000
FOOD SERVICE EMPLOYEE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2,000
HEALTH PHYSICIST	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2,000
OCCUPATION(UNK)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2,000
Total	271	177	0	94	37	36	704	1,035	1,739	3	4	116	120	1	1,660,000

NFC cost = \$2,000 per NFC

LWC cost = \$2,000 per LWC

WDL cost = \$1,000 per WDL

WDLR cost = \$400 per WDLR

ONE-LINE NARRATIVE REPORT

CASE NUMBER	DATE	ONE-LINE DESCRIPTION DESCRIPTION
(0544003) Los Alamos National Laboratory		
90193	07/04/90	Top of glass tube broke & lacerated finger while placing cap on tube
90237	08/13/90	Slipped & fell while climbing on water line, incurring multiple injuries
90321	07/10/90	Van struck rear of private vehicle during approach to stoplight
90325	04/18/90	Developed carpal tunnel syndrome in wrists after repeatedly using computer
90403	04/12/90	Incurred repeated trauma while manually assembling electron system
91057	01/18/91	Lost control of ATV on steep grade & fell on rock, bruising ribs & spleen
91071	04/12/91	Developed tendonitis in wrist & forearm using mouse on computer terminal
91099	02/19/91	Developed soreness in fingers after repeated use of keyboard & mouse
91115	02/25/91	Developed pain in shoulder after repeated use of computer terminal
91123	07/18/91	Incurred 2nd degree burn to leg on metal solder while using soldering iron
91133	07/29/91	Lacerated finger on drilling machine while trying to remove chips
91140	04/23/91	Developed overuse syndrome in wrists after typing repeatedly on keyboard
91161	03/04/91	Developed neck/shoulder pain after working on computer for extended period
91192	08/20/91	Strained back while lifting & carrying 60# boxes of documents
91207	03/06/91	Developed tendonitis in elbow from prolonged use of computer keyboard
91214	08/15/91	Strained back when sitting in inadequate chair during clerical work
91271	09/11/91	Developed tendonitis in elbow repeatedly using computer to perform job
91301	05/14/91	Strained groin muscle while attempting to lift drill press
91340	11/01/91	Developed overuse syndrome in hand from prolonged use of VDT
91342	10/29/91	Developed pain in cervical area from prolonged use of computer keyboard
91357	11/14/91	Developed overuse syndrome in wrist from prolonged use of VDT
91359	11/13/91	Developed carpal tunnel syndrome from prolonged use of VDT
91365	08/09/91	Developed tendonitis in wrists from prolonged use of computer
91398	12/12/91	Developed tendonitis in hand after working 31 years at terminal
92036	01/29/92	Tripped & fell on step while entering office, causing multiple injuries
92041	02/18/92	Developed inflammation in wrist & elbow while entering data on computer
92075	02/27/92	Developed strain to wrists & forearm while repetitively using computer
92229	03/06/92	Pickup & private vehicle collided when government driver failed to yield
92408	09/01/92	Bridge crane malfunctioned when operator ran limit switch at full speed

92419	12/01/92	Developed pain in wrists/thumb from extensive use of computer keyboard
92457	11/25/92	Vehicle left road & struck against barbed wire fence & posts
93041	02/08/93	Developed epicondylitis in elbow from prolonged use of computer
93048	02/09/93	Developed overuse syndrome in hand from prolonged use of keyboard & mouse
93056	03/02/93	Developed overuse syndrome in wrist from prolonged wordprocessing tasks
93057	03/02/93	Developed pain in back & shoulder from several years of computer work
93058	03/03/93	Strained both arms from routine computer work over past month
93059	03/05/93	Developed neck pain from prolonged use of computer
93075	03/03/93	Developed tendonitis in thumb while using scissors to cut paper during day
93076	03/23/93	Strained hands & fingers from extensive computer use for 8 hours a day
93083	04/02/93	Developed overuse syndrome in multiple body parts from use of mouse
93097	04/09/93	Developed overuse syndrome in wrist from prolonged work at work station
93099	04/09/93	Developed overuse syndrome in hands from prolonged use of keyboard
93112	04/23/93	Developed overuse syndrome in wrist from prolonged use of keyboard
93127	05/13/93	Developed carpal tunnel syndrome in wrist from prolonged use of computer
93133	05/20/93	Developed overuse syndrome in arm & shoulder from prolonged use of mouse
93137	05/18/93	Developed soreness/numbness in wrist from daily frequent use of keyboard
93142	05/24/93	Developed overuse syndrome in wrist/hand from prolonged use of keyboard
93172	06/18/93	Developed extensor tendonitis in wrist repeatedly typing/using computer
93176	06/30/93	Experienced wrist pain from 10 months of computer use
93209	07/23/93	Developed overuse syndrome in wrist/forearm from prolonged use of keyboard
93211	07/27/93	Developed ulnar neuritis in fingers from prolonged use of keyboard
93231	08/09/93	Developed pain in wrist & forearm from computer use
93232	02/16/93	Developed weakness in elbow from prolonged use of computer
93261	09/13/93	Developed overuse syndrome in wrist from prolonged use of computer
93262	09/24/93	Developed overuse syndrome in wrist from prolonged use of keyboard
93264	09/30/93	Developed pain in shoulder while performing routine computer work
93288	10/28/93	Developed overuse syndrome in elbow from prolonged use of computer
93290	11/04/93	Developed carpal tunnel syndrome in wrists from prolonged use of computer
93300	10/25/93	Developed overuse syndrome in wrists from prolonged use of keyboard
93303	11/17/93	Strained arm muscle while moving computer equipment into storage
93327	12/09/93	Developed discomfort/inflammation to hands while using computer
94025	02/02/94	Strained finger while using computer to perform routine activity
94037	02/11/94	Developed epicondylitis in elbow from routine computer work
94046	02/15/94	Developed tendonitis in thumb from prolonged

		use of computer
94070	03/24/94	Developed overuse syndrome in wrist/palm from using word processor
94077	03/29/94	Developed epicondylitis in elbow from moving machines & using computer
94094	04/25/94	Developed inflammation in elbow from opening & closing cylinder valves
94098	04/18/94	Developed overuse syndrome in wrists from prolonged use of keyboard
94102	05/04/94	Developed overuse syndrome in arms & hands from prolonged use of computer
94113	05/09/94	Slipped on freshly waxed floor & strained ankle while walking
94155	07/01/94	Developed tendonitis to both wrists typing long hours on computer
94168	07/18/94	Developed discomfort in wrist doing extensive keystroking on computer
94174	07/01/94	Developed overuse syndrome to upper back & neck area typing on computer
94193	08/01/94	Developed pain in wrists entering/typing data into computer
94197	08/01/94	Developed pain/discomfort in wrist/lower arm using computer extensively
94198	08/15/94	Incurred chemical burn when liquid phenol spilled on arm from pipette
94213	08/25/94	Developed overuse syndrome in wrist after repeatedly using computer
94220	09/06/94	Developed epicondylitis in elbow after repeated use of computer mouse
94221	09/15/94	Lacerated finger on knife while slicing onions during food preparation
94226	09/01/94	Developed overuse syndrome from prolonged use of computer
94246	10/01/94	Developed overuse syndrome in wrist from prolonged use of computer
94249	10/18/94	Developed tendonitis in wrist from prolonged use of computer keyboard
94251	10/19/94	Developed overuse syndrome in wrist from prolonged use of computer
94260	10/31/94	Developed overuse syndrome in wrist from prolonged use of computer
94262	11/01/94	Developed overuse syndrome in wrist from prolonged use of computer
94264	10/11/94	Developed carpal tunnel syndrome in wrist from prolonged use of computer
94272	11/22/94	Developed epicondylitis in elbow from prolonged use of computer
94294	10/31/94	Developed strain to elbow from prolonged use of computer keyboard
94295	11/01/94	Developed ganglionic cyst in wrist from prolonged use of computer
95005	01/05/95	Slipped & fell in icy car track resulting in elbow contusion.
95033	01/09/95	While packing supplies experienced pain resulting hip muscle strain
95037	01/27/95	Employee strained back when she moved box of books
95040	02/01/95	Routine computer work, caused overuse syndrome to forearm
95046	01/02/95	Employee experienced pain in arms & neck from routine computer work
95049	02/03/95	While cutting rubber sheeting employee lacerated thigh with pocket knife
95050	01/27/95	Numbness in forearm after prolonged keyboarding
95051	02/03/95	Caustic solution splashed on face causing chemical burn
95055	01/24/95	Cut cuticle on file folder, causing infection
95056	01/02/95	Pain developed after repetitive keyboarding

95068	02/13/95	Scissors slipped while cutting document, laceration to finger
95074	02/10/95	Fell onto stair platform while carrying equipment, laceration to thumb
95075	01/02/95	Developed wrist injury from repetitive computer use
95076	02/17/95	Caught thumb between elevator door and rack, causing fracture to thumb
95084	03/03/95	Struck head on wall outlet while standing up, causing laceration
95098	01/02/95	Developed carpal tunnel syndrome in hand & wrist while working at computer
95108	01/02/95	Injury to tendon & wrist after excessive VDT work
95109	03/14/95	Fell off stool & cut hand on glass slide, laceration to hand
95115	03/20/95	Injury to fingers, wrists & arms due to prolonged use of keyboard
95123	03/22/95	Moving furniture for new computer, causing lower back strain
95128	01/02/95	Strained shoulder while routine computer work was in progress
95129	01/02/95	Developed chronic muscle strain in shoulder from computer work
95131	03/31/95	Repetitive use of computer, causing strain in shoulder
95169	04/11/95	Strained hip & leg from packing boxes & bending over
95190	04/01/95	Developed tendinitis in finger from computer/trackball use
95192	04/01/95	Developed wrist overuse from extensive computer use
95196	04/25/95	Strained back while carrying metal stand
95211	05/01/95	Sustained lateral epicondylitis from excessive computer use
95218	05/01/95	Developed pain in multiple body parts from using computer mouse
95219	05/01/95	Developed wrist tendinitis from routine computer use
95224	01/03/95	Developed tendinitis of wrist while pipetting manually
95229	04/26/95	Feeding papers into microfilming equipment, resulted in wrist/thumb strain
95241	05/11/95	Developed pain due to poorly set up work station; also, low back pain
95262	05/01/95	Developed pain in thumb area from working on computer
95263	05/01/95	Strained trapezius muscles in neck from prolonged use of VDT
95279	06/01/95	Developed multiple injuries in arm from routine use of workstation
95286	06/09/95	Developed wrist pain while typing at computer
95287	06/01/95	Developed overuse syndrome in arm from prolonged use of computer
95288	06/07/95	Strained lower back while lifting 400-pound equipment racks
95299	06/15/95	Strained back when working in a squatting position while arising
95300	05/01/95	Developed wrist pain while doing data entry on computer
95303	06/21/95	Developed wrist disorder from using mouse & computer
95309	06/26/95	Strained shoulder while routine computer work was in progress
95310	06/26/95	Lacerated forearm on discharge tray by reaching across to clean roller
95315	06/27/95	Wrench slipped & struck finger against gasket holder, causing laceration
95319	06/27/95	Fell on curb while exiting van, causing

		fracture to hand
95320	06/27/95	Strained lower back while moving 70# boxes
95321	06/28/95	Strained lower back while lifting monitor
95322	06/01/95	Developed neck strain while doing routine computer work
95338	07/11/95	Strained neck from moving welder without help
95366	07/01/95	Developed epicondylitis in elbow from computer/trackball use
95382	08/13/95	Filling nitrogen dewar which injected into gloves, burning hands
95393	08/01/95	Developed overuse syndrome of arm by using keyboard/mouse/VDT equipment
95430	09/08/95	Developed epicondylitis from extensive VDT work
95440	09/18/95	Monitoring, fell through ceiling tile & abraded shin on supporting brace
95441	09/13/95	Contacted poison ivy while on raft trip resulting in skin rash
95443	09/11/95	Developed disorders associated with repeated trauma from computer use
95450	09/05/95	Developed arm/hand illness from extensive computer use
95451	09/08/95	Slipped on steep staircase while carrying heavy lid & strained lower back
95458	09/01/95	Developed possible CTS injury from lifting books & computer use
95462	10/03/95	Tripped & fell onto step, struck arm on step resulting in arm contusion
95467	10/06/95	Strained lower back moving equipment for relocation
95468	10/10/95	Developed wrist pain from VDT work
95478	10/13/95	Strained lower back while loading 100# phynolic material
95489	10/01/95	Pain developed in hands from keyboard & mouse use
95493	10/25/95	Struck knee on faucet stem while borrowing tools, injuring knee
95498	10/24/95	Strained back muscle after carrying office items/books
95504	11/02/95	Developed epicondylitis from excessive computer keyboard use
95505	11/02/95	Developed arm/shoulder pain during VDT work
95520	11/15/95	Developed wrist/finger injury from routine computer use
95524	11/22/95	Forklift rolled into depression, trapping employee under rollover cage
95529	11/20/95	Developed epicondylitis from routine computer work at improper station
95533	11/28/95	Developed chronic arm/shoulder muscle strain from VDT workstation use
95534	11/29/95	Incurred lower back strain when lifting 10# capacitor
95535	11/29/95	Incurred multiple injuries from routine VDT workstation use
95539	11/30/95	Incurred forearm injuries while working at poorly adjusted workstation
95546	11/01/95	Developed forearm epicondylitis from keyboarding & mouse use
95560	12/18/95	Developed elbow injury from extensive work at computer workstation
96011	01/10/96	Developed wrist pain while performing routine computer work
96013	01/12/96	Used pocket knife to cut tubing & struck finger, causing laceration
96016	01/17/96	Performing extensive keyboard work, resulted in wrist & hand injury
96017	01/18/96	Developed carpal tunnel syndrome from extensive work at work station
96040	02/06/96	Using liftgate to load control panel box &

96045	02/06/96	caught hand, causing fracture Loaded equipment into container, resulting in shoulder strain
96057	02/07/96	Performing work at work station, resulted in wrist & forearm injury
96064	02/16/96	Performing extensive work at work station, resulted in arm injury
96065	02/16/96	While moving bookshelf, bottom section fell on toe, causing fracture
96066	02/13/96	Strained lower back while carrying equipment up stairs
96067	02/20/96	Performing extensive work at work station, resulted in arm & wrist injury
96068	02/20/96	Developed hand & wrist pain while performing work at work station
96070	02/20/96	Performed work in poorly designed chair, caused neck & shoulder strain
96075	02/22/96	Bent down to pick up baggage, causing lower back strain
96111	03/13/96	Performed glassblower activities for many years, causing multiple injuries
96118	03/19/96	While using lathe, thumb struck rotating chuck, causing laceration
96140	04/01/96	Picked up heavy box of papers, causing shoulder strain
96142	04/02/96	Van door closed on fingers while delivering food, causing injuries
96147	04/05/96	Strained lower back while lifting cabinet to replace it on wall
96166	04/19/96	Performed extensive work at work station, causing carpal tunnel syndrome
96171	03/15/96	Developed arm strain from performing extensive work at work station
96177	04/25/96	Strained elbow while moving computer equipment for training program
96190	05/06/96	Performing work at work station resulted in forearm injury
96204	05/20/96	Strained lower back while bending over to perform work
96210	05/29/96	Sitting in chair to perform work duties, resulted in neck & back strain

(0544809) Protection Technologies Los Alamos

90001	01/12/90	Employee was thrown forward, straining muscle when van lunged forward
90007	04/06/90	Chipped tooth on rifle while assuming a prone position during training
90023	07/29/90	Fell & caught self while checking door, incurring sprain to wrist
90024	08/01/90	Contused buttock from falling while playing basketball
90027	08/07/90	Contused toe while playing volleyball
90029	08/21/90	Fell & struck knee on wooden post while running qualification course
90032	08/31/90	Stepped on rock while running & twisted ankle during fitness training
90033	09/05/90	Aggravated bleeding ulcer & lost consciousness while using Airdyne bicycle
90036	04/20/90	Barrier raised while van was proceeding through, causing damage
90037	05/30/90	Two government pickups collided at intersection, damaging both vehicles
90039	07/07/90	Pickup swerved off road into fence when insect flew into driver's eye
90041	10/25/90	Tripped & fell while checking badges at guard station, straining knee
90042	10/25/90	Slipped while playing basketball & sprained

		ankle
90047	12/09/90	Accidentally dropped ammunition box on foot & incurred contusion
91004	02/05/91	Incurred muscle cramp in leg while walking on treadmill machine
91007	02/13/91	Overexerted hamstring muscle running 40 yard dash, incurring strain
91011	03/05/91	Pulled muscle in thigh while running 40-yard dash
91012	03/05/91	Pulled hamstring muscle in leg while practicing ½ mile run
91040	06/21/91	Pulled hamstring in leg while running 40-yard dash
92015	03/26/92	Fell & fractured finger while running for security qualification
92018	03/31/92	Vehicle struck pole when driver failed to monitor area while backing
92041	07/15/92	Strained hamstring muscle while running 40-yard dash
92042	08/08/92	Pickup struck yield sign when driver failed to monitor area while backing
92064	03/16/92	Strained shoulder while being pulled by partner during training class
92067	03/19/92	Strained thigh muscle while performing take-down task during training
92072	06/10/92	Shield fell & abraded cheek while being closed after inspecting system
92073	06/14/92	Strained lower back while performing tumbling exercise during training
92077	10/16/92	Pickup struck against railing while being backed, causing damage
92080	11/18/92	Lost balance & sprained ankle while participating in handcuff training
93019	04/04/93	Security vehicle backed up into pickup, causing structural damage
93026	04/19/93	Incurred torn lateral meniscus to knee while practicing take downs on mat
93031	04/19/93	Missed punching bag during self-defense training & dislocated elbow
93035	06/16/93	Incurred sprained cervical muscle while improperly free lifting weights
93043	07/13/93	Misstepped while running in assault training & pulled hamstring muscle
93044	07/27/93	Stepped in hole taking cover during a training exercise & sprained ankle
93048	08/17/93	Strained back resisting a take-down during self-defense training
93050	09/04/93	Driver backed Bronco into vehicle grille guard, causing damage to door
93051	09/09/93	Blazer struck concrete structure while turning into area, causing damage
93059	11/26/93	Rear quarter panel was damaged when driver backed pickup into stop sign
93063	12/27/93	Pickup struck against concrete structure, while being backed from gate
94008	02/03/94	Sprained middle finger while falling during weaponless self-defense class
94009	02/04/94	Twisted & strained shoulder during weaponless self-defense training
94010	02/09/94	Diagnosed with sum-dural hematoma after hitting head on mat during class
94012	01/22/94	Van struck against pickup while being backed from parking space
94013	02/15/94	Strained shoulder muscles during weaponless self-defense training
94017	02/26/94	Pickup struck against building when driver misjudged distance
94021	02/07/94	Improperly executed fall & strained neck muscle during self-defense class

94022	02/08/94	Sprained knee while practicing fall during weaponless selfdefense training
94026	04/06/94	Incurred whiplash when pickup struck support beam while en route
94027	04/06/94	Pickup struck against support beam while en route, causing damage
94028	04/10/94	Bronco struck against barricade while attempting to stop on icy road
94029	03/23/94	Pickup struck against private vehicle while backing, causing damage
94034	05/14/94	Parked vehicle slid down incline backward & struck tree, causing damage
94046	07/27/94	Government vehicle struck post while leaving patrol area, causing damage
94055	09/16/94	Fell & contused knee while executing fall during self-defense training
94057	10/18/94	Missed curb while looking down & stepping up, causing strain to knee
94059	10/27/94	Strained shoulder muscle while performing horizontal strikes during task
94907	12/20/94	Suffered mental stress when person was accidentally shot by ammunition
95003	01/04/95	Vehicle struck embankment while attempting to get unstuck, causing damage
95004	02/11/95	Pickup struck concrete light pole when put into gear, causing damages
95006	02/21/95	Van struck vehicle while leaving parking lot, causing damage
95008	03/05/95	Vehicle struck goal while backing, causing damages
95009	02/28/95	Kicked punching bag during training class, causing strain to foot
95010	02/28/95	Landed wrong while participating in training class, causing strain to knee
95012	03/18/95	Vehicle struck building while on routine patrol duty, causing damages
95015	03/28/95	Vehicle slipped & struck light pole while turning around, causing damage
95016	02/25/95	Vehicle struck private vehicle while backing up, causing damages
95036	09/03/95	Struck electrical pole while backing vehicle, causing back strain
95037	09/03/95	Struck electrical pole while backing vehicle, causing damages
95038	09/06/95	While exiting parking lot, van struck parked sedan, causing damages
95042	11/04/95	Strained lower back while walking on treadmill for required fitness
95043	11/14/95	Stepped down from tailgate into tire stop trough, resulted in ankle sprain
96004	01/11/96	Neck & back popped while using exercise machine, resulting in neck strain
96005	01/16/96	Strained knee while using exercise machine
96011	04/24/96	Driver was inattentive while turning Bronco around & struck guardrail

(0544904) Johnson Controls, Inc.

90025	02/05/90	Strained right shoulder while pulling on pipe wrench to loosen fitting
90040	03/07/90	Overexerted back & shoulder area while helping lift sand-filled can
90101	06/25/90	Stepped on rock while exiting forklift truck, incurring sprain to ankle
90120	07/11/90	Slipped & fell while descending steps & sprained ankle
90168	09/06/90	Tripped & fell backward while sweeping stair landing & lost consciousness

90192	06/25/90	Stepped on rock & twisted ankle while dismounting forklift truck
90238	11/27/90	Slipped on ice while carrying supplies, incurring strain to back
91064	04/15/91	Strained back while bending down to pick up bucket while washing truck
91066	04/15/91	Strained muscle in lower back while bending down to get safety shoes
91072	04/22/91	Strained upper back while pulling 150# rig reamer from ground
91098	06/06/91	Hand slipped onto blade while adjusting guard of band saw, lacerated thumb
91106	07/30/91	Strained back while lifting sheetrock & door
91109	08/07/91	Strained back attempting to pull weed cutting machine while on incline
91138	11/26/91	Injured shoulder while lifting manhole cover to utilities pit
91156	12/11/91	Injured lower back while using wrench to unbolt pump base from floor
91164	12/19/91	Strained lower back while shoveling snow to reach equipment in parking lot
91177	02/27/91	Strained back while attempting to lift sandbag out of dumpster
91196	07/08/91	Strained back while moving 250# pipecutting machine with pry bar
91206	07/30/91	Strained back while lifting sheetrock
91216	09/10/91	Strained back while moving refrigerator
92202	10/13/92	Strained back while bending over & using crowbar to separate drums
92208	11/02/92	Strained back while emptying water bucket into sink
92220	11/24/92	Strained lower back while picking up 50# block of concrete
93226	12/06/93	Strained shoulder while lifting instrument box from bin in truck
94059	03/18/94	Strained back while handling heavy equipment
94060	03/22/94	Aggravated injury to disc in lower back while lifting tables & chairs
94088	05/20/94	Strained right side of back while loading salvaged equipment onto truck
94129	07/19/94	Experienced strain to lower back while bending over to retrieve hand dolly
94157	08/19/94	Strained back attempting to lift 50# box containing 4 gallons of soap
94505	07/27/94	Mirror on pickup struck ladder on vehicle while entering parking space
95023	02/02/95	Fell six feet from ladder while installing shocks & fractured knee
95057	05/01/95	Stepped on bolt & fell while walking, resulted in hip strain
95081	06/13/95	Backhoe struck foot & dragged employee, causing injury
95109	07/13/95	Lifted heavy bags & containers to transport, causing back strain
96007	01/17/96	Struck electrical line while using jackhammer, causing electrical shock
96046	04/08/96	With waste mobile cart to side, strained back while dumping 2 trash bags
96050	04/11/96	Tripped on mop, struck & broke rib on sink while checking towel dispenser

APPENDIX D

ORPS Subject Report

11/13/96 Occurrence Subject/Title Report
Sorted by Occurrence Report Number

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Occurrence Report Number/ Facility Name	Occurrence Category	Report Type/ # of Occur.	Discovery Date	Report Date
ALO--GOAL-ALMSD-1990-0003 AL Management Support Division TITLE: CONSTRUCTION WORKER FALL FROM SCAFFOLD.	Off-Normal	Final 1	11/16/90	09/23/94
ALO-KO-SNL-TA1ALBQ-1991-1016 Tech. Area I, Balance TITLE: Electrical Outage Causing Disruption in Operations.	Off-Normal	Final 1	06/25/91	09/25/91
ALO-LA-LANL-HRL-1994-0004 Health Research Laboratory TITLE: Issuance of Stop Work Order for Cutting of Energized Electrical Wires in Steel Electrical Conduit Buried in a Concrete Floor	Off-Normal	Final 1	10/26/94	09/25/95
ALO-LA-LANL-PHYSTECH-1991-1006 Physical and Technical Supt. TITLE: Human Resource Laboratory (HRL) Addition Construction Safety Violations, TA-43	Off-Normal	Final 1	09/24/91	01/31/92
ALO-LA-LANL-SERVICISS-1991-1553 Services Support Subcontractor TITLE: Unplanned electrical outage disrupting normal operations.	Off-Normal	Final 1	07/23/91	10/24/91
ALO-LA-LANL-WASTEMGT-1994-0002 Waste Management TITLE: Herman Miller wall shelving fell on employee's desk.	Off-Normal	Final 1	06/20/94	12/20/94
CH--AMES-AMES-1994-0006 Ames Laboratory (BOP) TITLE: Electrical shock causes electrician to fall from ladder. Worker sent to local emergency room. No injuries reported. Returned to work.	Off-Normal	Final 1	08/18/94	10/12/94
CH-AA-ANLE-ANLEAPS-1995-0002 Advanced Photon Source TITLE: Construction worker injury	Off-Normal	Final 1	01/13/95	02/27/95
CH-AA-ANLW-FCF-1991-1004 Fuel Conditioning Facility TITLE: Accidental drop of an electrical feedthru in the FCF Mock-up Area.	Off-Normal	Final 1	08/22/91	05/15/92
HQ--SPR-WH-1995-0004 West Hackberry Site TITLE: Dragline Incident resulting in near miss at Raw Water Intake Structure	Off-Normal	Final 1	11/21/95	03/04/96
HQ--URA-SSCL-1993-0001 SSC Laboratory TITLE: Fatal Tunneling Accident	Unusual	Final 1	01/29/93	04/21/94
ID--EGG-FACENG-1994-0002 Facility Engrng Group fac. & oper. TITLE: Construction incident concerning failure of the HEPA exhaust fan.	Off-Normal	Final 1	09/10/94	02/03/95
ID--MKF-FPRCONST-1991-1001 FPR Construction Area within ICPP TITLE: EBASCO CONSTRUCTORS MANITOWAC 4000 CRANE DISASSEMBLY ACCIDENT	Off-Normal	Final 1	05/04/91	10/15/92

ID--MKF-FPRCONST-1991-1002	Unusual	Final	05/06/91	10/15/92
FPR Construction Area within ICPP				
TITLE: SUBCONTRACTOR PERSONNEL WORKING ON SUPERSTRUCTURE STEEL WITHOUT FALL PROTECTION				
ID--MKF-FPRCONST-1991-1003	Unusual	Final	06/19/91	10/15/92
FPR Construction Area within ICPP				
TITLE: UNPROTECTED OPENING IN THE WALL/FALL HAZARD				
ID--MKF-FPRCONST-1991-1004	Unusual	Final	06/19/91	10/15/92
FPR Construction Area within ICPP				
TITLE: IMPROPERLY BARRICADED FLOOR OPENING - ON THE FIRST LEVEL SLABOF THE FPR SUBSTRUCTURE				
ID--MKF-FPRCONST-1991-1008	Unusual	Final	08/09/91	03/03/92
FPR Construction Area within ICPP				
TITLE: NO FALL PROTECTION - EMPLOYEE FAILED TO USE FALL PROTECTION				
ID--MKF-FPRCONST-1992-0006	Off-Normal	Final	09/28/92	12/11/92
FPR Construction Area within ICPP				
TITLE: IMPROPER OPERATION OF PERSONNEL LIFT.				
ID--MKF-MOUITEM1-1992-0003	Off-Normal	Final	06/23/92	02/04/93
Memorandum of Understanding - EG&G				
TITLE: PERSONNEL INJURY ON DRILLING PROJECT AT RWMC				
ID--MKF-MOUITEM1-1992-0006	Off-Normal	Final	08/20/92	02/04/93
Memorandum of Understanding - EG&G				
TITLE: OCCUPATIONAL INJURY - TAN DRILL RIG.				
ID--MKF-MOUITEMS-1991-1006	Unusual	Final	06/12/91	03/03/92
MOU's between MK-FIC & Oper. Contr.				
TITLE: IRONWORKER SUBJECTED TO A FALL HAZARD IN EXCESS OF 15 FEET. NO FALL PROTECTION ie. WHILE STANDING				
ID--MKF-MOUITEMS-1991-1008	Unusual	Final	06/25/91	03/03/92
MOU's between MK-FIC & Oper. Contr.				
TITLE: ERECTING SCAFFOLD WITHOUT THE PRESENCE OF COMPETENT AND QUALIFIED INDIVIDUAL TO REVIEW AND APPROVE WORK				
NVOO--REEC-OMDO-1992-0052	Off-Normal	Final	09/01/92	02/11/93
Operations and Maintenance Division				
TITLE: Occupational Injury (Back) - Resulting in Inpatient Hospitalization				
OH-WV-WVNS-CF-1995-0006	Off-Normal	Final	02/21/95	05/03/95
Common Facilities				
TITLE: Chemical Process Cell Crane Power Cable Takeup Reel Falls				
ORO--MKFO-K25CONSTRM-1993-0011	Off-Normal	Final	11/24/93	02/24/94
Construction Management (K25 Site)				
TITLE: Fall Protection Violation, Work Order 7290, Building K-1650				
ORO--MKFO-K25CONSTRM-1994-0001	Off-Normal	Final	03/16/94	04/22/94
Construction Management (K25 Site)				
TITLE: Energized 120 Volt Cable Partially Cut During Demolition Activities (3/16/94), W. O. 7316				
ORO--MKFO-X10CONSTRM-1992-0008	Off-Normal	Final	03/05/92	03/26/93
Central Engineering (ORNL Site)				
TITLE: White Oak Creek Embankment Project				
ORO--MKFO-Y12CONSTRM-1992-0018	Off-Normal	Final	11/16/92	01/19/94
Central Engineering (Y-12 Site)				
TITLE: Subcontractor Employee Violates Fall Protection Procedure				
RFO--EGGR-SUPPORT-1992-0012	Off-Normal	Final	01/24/92	09/28/93
Support Services				
TITLE: #0108/Temporary degradation of radio communications				

RL--PNNL-PNNLBOPER-1994-0043	Off-Normal	Final	09/02/94	06/21/95
Energy Research Programs (PNNL)		1		
TITLE: Multiple Subcontractor Problems at the 331 Building.				
RL--PNNL-PNNLNUCL-1993-0033	Unusual	Final	06/24/93	09/28/93
PNNL Nuclear Facilities		1		
TITLE: Smoldering Dust Stop and Roughing Filter in 325 Building C-Cell.				
RL--WHC-KHPNL&L-1996-0001	Unusual	Update/(Fnl.)	02/23/96	04/04/96
ICF KH PNL Landlord		1		
TITLE: Fall Hazard Greater Than 6 Feet				
RL--WHC-TANKFARM-1993-0057	Unusual	Final	06/22/93	02/20/95
Tank Farms		1		
TITLE: KEH CRANE ACTIVITIES IN 241-SY TANKFARM RESULT IN TWO-BLOCKING MAIN HOIST BLOCK, SEVERING WIRE ROPE AND BLOCK FALLING TO GROUND				
RL--WHC-WHC1100EM-1993-0024	Off-Normal	Final	08/26/93	01/17/95
1100 Area/Env. Restoration Waste Mgt		1		
TITLE: SAWCUTTING IN CONCRETE FLOOR SEVERED UNDERFLOOR 110 V ELEC LINE				
SAN--SU-SLAC-1996-0008	Off-Normal	Final	08/06/96	09/03/96
Stanford Linear Accelerator Center		1		
TITLE: Contractor Employee Fell.				
SR--WSRC-REACC-1992-0005	Unusual	Final	09/29/92	12/17/92
C-Reactor		1		
TITLE: Trolley in C Reactor Stack Area Fell off Monorail Beam (U)				
SR--WSRC-TNX-1995-0002	Off-Normal	Final	01/31/95	04/05/95
T and X Facility		1		
TITLE: Trench Incident: Southeast Corner Building 670-T (U)				

CAIRS One-Line Description

CASE NUMBER	DATE	DESCRIPTION
(0544904) Johnson Controls, Inc.		
95023	02/02/95	Fell six feet from ladder while installing shocks & fractured knee
(0575003) Inhalation Toxicology Research Inst.		
92008	06/30/92	Lacerated arm on exposed metal edge while installing new duct work
(0578006) Sandia Lab Subs		
92005	02/18/92	Incurred injury to spine while carrying 2 five-gallon buckets of concrete
(1001006) BNL Lump Constr. Subcontractors		
94003	12/16/94	Nail gun slipped & activated while loading, 3" long nail pierced foot
(1002505) Fermilab Cost Constr. Subcontractors		
91003	05/22/91	Fell when ladder slipped away from wall, contusing body & leg
(3005016) LITCO Subcontractors - Construction		
91079	05/01/91	Wrench slipped while tightening anchor bolts, striking & lacerating finger
92009	06/23/92	Drill pipe fell & lacerated arm during drilling procedure
93006	10/26/93	Pinched finger in u-joint of drive shaft installing drive shaft in machine
(3005206) LESAT Subcontractors		
95002	12/13/95	Fell off ladder, causing fracture to thumb
(4005506) Rust Engineering Subs		
90001	07/20/90	Fell into excavation when struck by backhoe, injuring elbows & hip
(7503005) Kaiser Engineers Hanford - Cost Const		
91048	08/17/91	Strained lower back when body harness bound up legs while lifting plank
92039	07/25/92	Fell through plastic while installing suspended ceiling, fracturing arm
93224	11/10/93	Eye was contacted by foreign body while holding scaffolding for co-worker
(7503006) Kaiser Engineers Hanford - Lump Const		

94257 07/07/94 Slipped leaning on ladder &
contused/lacerated chest on metal brace

(8500505) Bechtel Construction - SR

92057 04/02/92 Tripped on pallet while setting roof rebar
mats & injured elbow

93096 07/16/93 Strained shoulder when co-worker tripped on
cord while grinding

(8500516) Misc. S.R.S. Const. Subcontractors

93001 09/08/93 Thumb was struck/fractured in pinch-point
between panel & top of ladder